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Table of Contents

Editor's Notes

I didn't have a theme in mind when the call for papers for this issue went out, but as submissions came in, I was pleasantly surprised find that one emerged anyway. Each piece in this issue examines some aspect of finding direction. Articles include explorations of how fruit flies find their way, how recovering addicts paths led them to and from drug addiction, where prehistoric civilizations sought resources to survive, and, finally, walk us through the nuances of rhetoric. Jen Bracy's amazing cover art is the perfect lead into this issue, with its images evoking thoughts of journeys, discoveries, and adventure.

Each year I am amazed by the quality of submissions we receive. This is due entirely to the hard work of the students and faculty who authored, reviewed, and sponsored these pieces. Thank you to all of you for your amazing work. I hope you enjoy reading this issue as much as I have.

Camila Gabaldón,
Editor, *PURE Insights*

Cover Art: Wanderlust

Jen Bracy, Western Oregon University

A collage of images found by Jen Bracy. This design uses a wide variety of objects, from cellular to geologic structures and patterns, to reference the earth. There are numerous ways to travel to other cultures, literally or metaphorically through stories and research. One who is curious and open truly experiences the richness and diversity of life on this planet.

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"Drugs was My Solution -- My Problem was Life": Heroin Addiction and the Life Course Perspective

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Heroin and other opiate dependencies affect individual users, interpersonal relationships, and communities. The purpose of this qualitative study was to better understand the life course paths of individuals who have been through addiction, treatment, and are currently in recovery. In-depth interviews were conducted with five participants in recovery to learn their retrospective account of how early and current life experiences shaped their addiction, treatment, and recovery. Participant narratives suggest that early childhood experiences, specifically parental abuse and social rejection, combined with substance abuse as a model for coping, influenced the development of addiction. Participants' expressed the importance of social support and self-awareness during and after treatment to sustain their recovery.

Keywords: heroin addiction, recovery, family relationships, life course perspective

Heroin addiction harms not only the user but also the greater community. Issues of employment, financial resources, and unlawful behavior influence the local economy and community as a whole (Mark, Woody, Juday, & Kleber, 2001). Experts estimate the annual economic cost of heroin addiction to be over $21.9 billion in the United States (Mark et al., 2001). Law enforcement, treatment services, and DHS (Department of Human Services) typically interact with people with heroin addiction. Others in the community may not see specific behaviors as symptoms of a disorder—which is, in this case, addiction—but rather as a series of choices that are completely within the individual's control (Fulton, 1999). As a result of this, addicts perceive high levels of stigma against them, even when they are in recovery and actively engaged in treatment (Luoma et al., 2007). The goal of this study was to illuminate the perspective and experience of individuals who identify as recovering heroin addicts. Specifically, we sought their retrospective accounts of the role of early and current life experiences in shaping their risk for addiction, treatment, and recovery.

Heroin addiction is a disorder (American Psychiatric Association, 2013). Multiple uses require continued use and increased dosage to avoid withdrawal symptoms (Van Zyl, 2009). Substance abuse corresponds with increased spending and drug-seeking behaviors that can have negative personal and interpersonal consequences (Cheng, Lu, Han, Gonzalez-Vallejo, & Sui, 2012; Higgs, Jordens, Maher, & Dunlop, 2009; Simmons & Singer, 2006). The National Survey of Drug Use and Health (NSDUH, 2011) determined that 1.6% of the population had used heroin in their lifetime, and individuals aged twelve and older who had used in the past month was just over 0.1%. It is estimated that the total number of heroin users per year in the United States is 560,000, and the number of frequent users is approximately 338,000. Many researchers agree that the prevalence of heroin use is likely higher than these estimates because of inaccurate reporting (Mark et al., 2001). Longitudinal research on long-term success of opiate and heroin recovery is scarce. However, one study from Australia suggested that, depending on the form of addiction intervention, long-term success rates for those in treatment can range from 52-63% (Ross et al., 2004). Despite low prevalence rates, heroin's highly addictive potential is especially dangerous (Cheng et al., 2012; Vaillant, 1988; Van Zyl, 2007). Withdrawal symptoms of heroin are so extreme that the individuals may use to avoid enduring multiple days of nausea, muscle/ bone aches, sweating, and insomnia ("National Drug Strategy," 2013).

For this study, the life course perspective provided the theoretical lens for understanding heroin addiction. The life course perspective provides a temporal framework for understanding the development of the individual and the family unit. This perspective takes into account the historical, cultural, and societal context in which the individual and family unit expresses stability and change over time and lends insight into unique

changes within social contexts (Connidis, 2011). Specifically, the life course perspective focuses on pathways through the lifespan, age-related roles, transitions, and trajectories over time (Hser, Longshore, & Anglin, 2007). Additionally, the life course perspective provides an understanding of how the individual, family unit, and community changes interact and influence the other.

A life course perspective is an appropriate lens for investigating substance dependence because of the known role of early life experiences, family, and environment in addiction (Hser et al., 2007). In terms of family, individuals whose parents modeled substance use may be more likely to repeat that behavior, having learned this specific coping method instead of healthier alternatives (Hedges, 2007; Hser et al., 2007). In addition, individuals may be more likely to develop drug dependence because of genetic factors that make them more susceptible to addiction (Hawkins, Catalano, & Miller, 2007). In terms of childhood experiences, Van Gundy and Rebellon (2010) found that adolescence-specific stressors and high stress environments corresponded with potential future substance abuse. Early marijuana use alone did not explain later substance abuse. The life course perspective helps to illuminate how modeled substance use in the home and traumatic or stressful events may increase risk for addiction.

In this study, qualitative methods were employed to aid our understanding of the heroin user's perspective of addiction, treatment, and recovery within their social context. The research questions investigated in the current study were: a) How do adults with heroin addiction perceive the role of earlier and current life experiences in shaping their addiction and recovery?; and b) How do adults with heroin addictions experience and evaluate their family, peer, and community relationships over time?

Method

Scholars have recognized the importance of qualitative methods in understanding individuals who struggle with addiction (Neale, Allen, & Coombes, 2005). This exploratory qualitative study examined the experiences of post-treatment, long-term recovery individuals with a history of heroin or other opioid addiction. Recruitment was conducted after university Institutional Review Board approval. The criteria for participation in the study included participants who: a) were 18 years of age or older, b) experienced a history of heroin or other opioid addiction, and c) completed at least one year of ongoing recovery time. Identification of participants occurred with the help of a community administrator of a treatment agency in Oregon who agreed to assist in recruiting participants who met the study's criteria. Five participants expressed interest in participating in the study, and their names were forwarded to the first author. This convenience sample strategy resulted in participants who were comfortable sharing their narratives and were affiliated with the targeted treatment agency

All agency-identified participants were contacted by the first author to determine interest and orient the participant to the study. After informed consent procedures, participants were interviewed about their childhood and personal history, addiction history, recovery experiences, and continued abstinence. Interviews were conducted at the participating treatment agency. The semi-structured protocol included demographic and open-ended questions. Participants were asked questions regarding their family of origin, school experiences, first exposure to drugs and alcohol, addiction and recovery processes, as well as current social support resources. Examples of specific questions included: How was your relationship with your parents growing up?; As you think back on your childhood, are there experiences that you feel contributed to your addiction?; and Please tell me the story of your recovery process? Interviews ranged from 45 minutes to an hour in length, and participants were free to discuss the elements of their addiction story that they found to be most relevant, although certain elements such as family history and peer relationships were actively probed as per the interview protocol.

All recorded interviews were transcribed verbatim, and each transcript was read several times by the first and second authors and later discussed during research meetings. A coding system (Berg, 2008) was developed for analysis. Nineteen major codes (i.e. school history, parental influence on addiction) and 49 subcodes (i.e. performance in school, influences involving mother) were used to analyze the transcribed interviews. Pseudonyms were used in the analysis and presentation of the data. Many aspects of the methods contributed to the rigor of the study, including immersion in the data, supervision by an experienced qualitative researcher (second author), and notes of analytical hunches prior to the coding process (Morrow & Smith, 2000).

Participants

Five individuals were interviewed for this study and reported heroin ($n = 4$) or prescription opiate addiction ($n = 1$). Four men and one woman were recruited, with ages ranging from 33-55 years ($M = 39.60$, $SD = 8.76$). Four participants identified as White and one identified

as Hispanic. Time of sobriety ranged from 2-10 years (M = 6.60, SD = 3.44). All participants earned a GED (n = 4) or completed high school (n = 1), and all participants attended a minimum of two years of college courses.

Results

Participants described in detail their childhood experiences, addiction history, and their treatment and recovery journeys. In the following section, we highlight four themes that emerged from participant narratives. First, participants identified the family influences that occurred earlier in life that they felt contributed to their addictions. Second, participants referred to experiences outside of their families of origin, citing peer influences—bullying, pressure, and acceptance as factors that deepened their drug use. Third, participants shared common experiences regarding drug use and what contributed to their most recent successful transition to recovery. Finally, participants emphasized the importance of giving back to the community and forging new pathways once recovery was achieved. Working in settings to help others who struggle with addictions gave meaning to personal journeys.

"I Felt Very Abandoned": Early Childhood Context

The most noteworthy factors that appeared to contribute to addiction later in life focused mainly on childhood experiences, specifically those relating to participants' family of origin.

Early exposure to drugs and alcohol. One commonality across all five interviews was the presence of parental substance abuse in participants' homes during childhood. Each participant had at least one parental figure who they described as having a substance abuse problem, and three participants noted substance use in more than one parental figure in the home. Alcoholism was the most common expression of parental addiction and was present in at least one parent or step-parent across all interviews. The presence of alcohol underscored a home environment that commonly was viewed as unsafe and unpredictable. As one participant shared, his early family life was "volatile—very, especially when alcohol was added to the mix." Another participant explained, "As a kid I saw nothing wrong with it [alcohol abuse]. As I got older, I could definitely see some problems, and they pretty much all revolved around my dad's drinking and his anger."

Three participants indicated an understanding of the biological nature of addiction as contributive to their disease, sharing a generational perspective on alcohol and drug abuse. For instance, Samuel attributed his father's alcoholism as a genetic factor in the development of his addiction. He noted, "So I'm pretty sure I was born an alcoholic, at least the mindset, the disease of alcoholism."

Childhood stress and trauma. Whereas three participants acknowledged the genetic nature of their disease of addiction, everyone attributed their later dependence to the various types of abuse they had witnessed and personally experienced in their childhood homes including physical abuse, emotional abuse, sexual abuse, and family violence. A similarity across interviews was the presence of parental abuse during childhood perpetrated against both the participant and other family members. One participant shared that his household was marked by verbal and emotional abuse, while the other four participants also described physical abuse in their homes. For instance, Gary explained his household after his mother remarried by describing that he and his sister were frequently abused by their stepfather. He stated that there were many experiences of "a lot of verbal and physical abuse to myself and my sister. Horrific physical abuse to my mother." Sexual abuse was noted by one participant. This participant, Jessica, described the abuse perpetrated by her stepfather, in addition to the sexual abuse at the hands of her biological father when she was sent to live with him later in her teenage years:

> It was with my stepfather. It was emotional, physical, sexual. It was, I mean, any of the abuses. Financial, like I had, at 13 years old, I had to work in the bean fields and babysit for my own school money to buy school clothes. He wouldn't let my mom buy me anything…He separated us from our family, especially me.

School experiences. In addition to the childhood experiences in the home that were noted by participants to be influential in the development of their later drug dependence, social rejection during childhood and early adolescence was another common element. This included experiences as the target of bullying, as well as feelings of social anxiety and not fitting in. Marco explained the trajectory of bullying and how it led to other outcomes that influenced his choices to engage in drugs:

> Everyone on welfare during that time that had to wear glasses, had those kind of glasses, which made me just a complete target. Teachers never participated whatsoever in deflecting any of the bullying. There was no research on bullying like there is now. I didn't trust the teachers, because I didn't feel they cared. It was not a safe place for me. So not only did I feel like I was a piece of shit at home . . . then through kindergarten through whatever, elementary, I felt even less

> than because I didn't fit in and I wasn't up to par with knowing how to do stuff. So then I just acted out behaviorally. By me acting out behaviorally, they started kicking me out. So I thought, well, cool. Now, I don't gotta go.

As Marco explained, these experiences often led to poor academic performances, which tended to further exacerbate participants' desire to disengage from their education. All participants described eventually assimilating into a peer group where they found acceptance and friendship, although often among peers that were involved in drugs and alcohol.

First experimentation with drugs and alcohol. Peer groups tended to encourage and reinforce substance use and other delinquent behavior such as fighting and stealing. Each participant was asked to discuss a first experience of inebriation under the influence of illicit substances. All participants described their first use as a part of their social environment, whether a friend offered them drugs or alcohol or the group set out to consume them together. Daniel discussed how he found that his initial experiences with alcohol finally allowed him the social confidence he felt had been missing. He stated that after his freshmen year in high school, "I started drinking more and more and it just, it made me more sociable. I could get over the internal fear of talking with other people and I seemed to fit in and I had fun." Jessica described her first use beyond marijuana and alcohol with her peer group:

> I was sixteen years old and I did my first line and I fell in love with it. And that's all I wanted to do. I loved how it made me feel. I didn't care, I was invincible. No one could hurt me anymore. And these people did that. And they liked me, and I wanted to be part of that.

None of the participants, however, began with heroin or other opiates but rather eventually used them. Given the circumstances of their home and school environments, participants shared that drug use became a means of coping with those things that felt out of their control and damaging to their well-being.

"I Went to Jail for That": Key Elements of Dependence-Related Experiences

Alcohol typically was the most common substance of first use, as well as the one on which most participants developed a dependence either in addition or prior to their addiction to heroin. As Dave explained, "I've been exposed to alcohol since I was young. I probably had my first sip around, I don't know, age 8 or 9. Maybe 10." Marijuana and hallucinogenic drugs also were typical first-use substances as highlighted by one participant when he explained, "We were experimenting. I think I used marijuana the first time at age ten or eleven." Each participant's addiction to substances progressed until he or she began habitually using heroin, or in one case, prescription opiates. Most participants also continued their dependence on alcohol or other drugs in addition to their heroin use.

A number of strategies were employed to obtain heroin and other opiates across participants. Gary, who mainly used prescription opiates, had learned to manipulate doctors and hospitals into giving him morphine and prescribing him medication. He described his elaborate understanding of the nature of communication between hospitals in the area: which doctors would contact doctors in other areas about his attempts to obtain medication; which ones were suspicious; and which ones still believed his claims of unendurable pain:

> If I was on vacation in Central Oregon, and I could get away from the campsite for a little bit, I'd drop in to the emergency room at the hospital … I knew which hospitals gave what, and I knew that the urgent care at [Hospital A] and [Hospital B] did not communicate. And I knew which days, which doctors were on rotation, and I just knew how it worked. And they had a very poor system. I capitalized on it, and by design it was for people to be honest, and I was not.

He also stole bottles of unused medication from friends and family, preferring that to stealing from strangers or contacting drug dealers.

Other participants shared that they did what it took to have enough money to pay drug dealers. These strategies included prostitution, bank robbery, burglaries, drug dealing, and stealing ("boosting") large appliances from department stores to sell later. Marco discussed taxing other drug dealers as one of the major distributors in the area. He shared:

> In California, you have to pay taxes to local gangs. . . Not anyone can sell drugs. So, sometimes I would just tell people, "Hey, if you're going to sell, if you don't want me to rob you, then you gotta give me this much every single week."

Four participants had interactions with law enforcement because of the criminal activity they engaged in to obtain drugs. As Dave explained, "I was

thrown out of school for, uh, for selling LSD in school. I went to jail for that. That was the first experience with that." Two participants were in and out of the penal system until their final stint in treatment.

The nature of participants' relationships with their family, peers, and communities immediately prior to treatment were similar across interviews. At the time of active addiction, the only participant who still had a close relationship with a parent had engaged in drug use with both his mother and wife, and had journeyed with them through dependence and recovery. Four participants, however, described their relationships with siblings, parents, and extended family members as "nonexistent." A typical response from participants regarding relationships with family members during drug dependence included words such as "distance" and "neglect." Reflecting on this period, Daniel shared, "If my dad was a little more involved with my life, I think I might have made better choices."

Participants also highlighted how their drug dependence experiences affected their abilities to find and maintain employment, parent children, and engage in socially-accepted activities. One participant lost his job and marriage due to a relapse after a ten-year period of sobriety. Three participants had their children taken by DHS before entering rehabilitation services. Three participants were living in poverty, and the other two participants were supporting themselves by selling illicit substances. Participants particularly shared difficulties in obtaining and maintaining employment. There was a sense that participants knew they were capable of more, but because of incarceration, pre-employment drug-testing, or having previously been fired for drug-related reasons, they were often simply unable to find work that could stimulate or challenge them. Marco described his frustration with the kind of employment that was available to him:

> I had no work history and I had a whole bunch of criminal history. So, the jobs that I could get were all general labor jobs that left me unfulfilled emotionally and spiritually and mentally. Just, it wasn't a challenge for me. It was completely grunt work.

"Somebody Made You Go": Steps to Recovery

Across participant narratives, there also were common influences identified that shaped their motivation to enter treatment and engage in recovery. Although there were experiences of poverty, loss of relationships, and a sense of alienation from one's community, each participant was motivated by an external force, whether that was family members, friends, or a community resource, such as DHS or a parole officer. As Gary put it:

> In some way or another, somebody made you go. Because, nobody ever wakes up one day in their addiction and raises their hand and volunteers to go to treatment. You go to treatment for a variety of reasons. One is, you got nowhere else to go, or some external force has applied motivation to you, whether it be your family, or the legal system, or your doctor, or whatever. Nobody wakes up one day and says, "I want to go to treatment." They do not.

Although external support was found to be substantial in the accounts of treatment experiences, there was a general consensus that ultimately the success of treatment was up to the individual in treatment. Dave is now a treatment counselor after going through his own journey of addiction and treatment. His work allowed him to provide significant insight into the likelihood of successful treatment and recovery:

> But really, it's on the guy coming through the door, ultimately. If that person has hit a point where they've hit their bottom, they surrender. They don't wanna fight anymore, and they're really coming genuinely from that place. Anybody can be successful at that.

The most notable similarity among participants that contributed to treatment success was the presence and impact of the support they received from peers in treatment and support groups. Each participant mentioned the importance of the bonds formed with people they met in treatment who understood where they had been and what they were currently experiencing. Participants discussed how treatment peers were always willing to help, whether that was lending a supportive ear, providing childcare, or helping the participant move. When asked to describe their current peer support, it was clear that participants' post-treatment peer relationships provided more meaning than their peer groups during addiction. Jessica met her best friend in treatment, and like the other participants, continues her friendships with her recovery peers. She discussed the significance of her current friendships on her treatment and continued recovery:

> If it wasn't for them, I would not be here. They are the ones that hold me up to this day. They're the ones that are there for me; hold me when I'm crying. And it's the bonds that I have with them and the sisterhood… I have great friends that want nothing more from me than just me.

Another important factor in recovery was family support, both during and after treatment. As stated previously, family relationships were generally described at an all-time low just prior to entering treatment. Healthy family members had for the most part "written off" their substance-dependent child or sibling prior to the participant seeking treatment. Participants reported, however, that at least one family member was supportive throughout the treatment process, and that family relationships overall had vastly improved since their recovery. Families of participants, especially their parents, tended to provide childcare as the main expression of support. In one case, the participant's family now sought support from him, and viewed him as one of the more stable members of his family. Although most participants were not especially close with their parents post-treatment, all of them reported having made amends to the point of civility at minimum. Dave, whose relationship with his father was volatile as a child and adolescent, described the nature of their connection today:

> My father's still on the East Coast. We don't talk a great deal. But I think we've gotten to a place where we've moved past our resentments and at least communicate…We communicate openly. There's no animosity. [chuckles] Sort of the antagonistic nature of that relationship has disappeared.

Participants also indicated a new level of awareness of themselves and the nature of their substance use and addiction. One of the key parts of treatment was working with counselors and support groups to begin talking about the emotions and traumas that are covered up or forgotten from childhoods. Because of this, participants were able to articulate low feelings of self-worth and esteem prior to and during addiction, as well as their relationship to heroin and the other drugs they had used. They were able to reflect on the destructive nature of their dependence, and how their poor emotional well-being had both contributed to and been harmed by their addiction. Marco described the emotional effects of using heroin:

> Drugs make you feel more of whatever it is you're in the mood for feeling. So if you're feeling like, that person is cute. Or that person is really nice. It's like, "Oh my god, I've never seen anyone so gorgeous in my life."…But if you're feeling sad, or you're feeling like someone let you down, you're like manic-depressive, crying. Or you're full of rage and anger and you're putting your hands on people. 'Cause you're just so frustrated…So, it left whatever relationships I had there at the end—is hurt relationships, untrusting relationships, unhealthy relationships.

The numbing nature of heroin and other opiates was mentioned as something that participants often felt the need to chase in order to escape the emotional pain they experienced at the time. Gary described his addiction as a disease and its relationship to his emotional state prior to treatment and recovery:

> [Addiction] has everything to do with your behavior, and your thought processes, and the way that you perceive the world around you, and your inability to reconcile your emotional condition with your outside environment. And it creates a condition that you cannot stand how you feel. So your condition is that you develop this dependence on changing how you feel.

Marco described the emotional component of his relationship with drugs at the beginning of the development of his dependence. His initial drug use, which consisted of alcohol and marijuana, occurred at age eleven. Prior to this experience, he grew up with his parents who were separated and witnessed drug abuse, criminal activity, and physical violence in the home directed toward himself and others.

> And drugs was not my problem. Drugs was my solution. My problem was life. I was always filled with fear. I always felt insecure. I was scared all the time. I had anxiety going on, 'cause I never knew what was going to happen next. But when I drank, and I smoked that weed, and I had that girl that night, I felt I could accomplish anything in the world. It was like I was Superman.

They knew that their individual histories had set them on a path to addiction, and at the same time had taken responsibility for their actions, including those that led them to treatment and sustained recovery.

"Giving Back": Interfacing with Communities after Treatment

Participants in this study were employees at a treatment agency, so the nature of their employment would indicate that they would likely feel positively connected to their communities as they worked with community partners in serving their clients. That is, in fact, what the interviews suggested. Participants reported feeling more connected to their communities, as well as an increased sense of meaning in "giving back." Marco underscored his new feelings of connection to his community after he was in recovery. He shared, "I see myself as continuing to be a member of our community. I'm thinking about politics." Participants tended to

balance their perceptions about how the community treated them prior to treatment with an awareness of their state and behaviors amidst their addiction. However, there was a sense of the desire to use their experiences to work to improve a system that they felt had both failed them and saved their lives. As described above, Marco was seeking ways to give back to his community by potentially entering politics. He also shared his life course trajectory that led to his current commitment to community engagement. Marco developed his addiction in early adolescence and described extensive experience with both negative and positive feelings toward his interactions with community resources throughout his lifetime. He now used his past experiences with addiction to make a difference in his work within the treatment agency. He illustrated his commitment by sharing his past history and how that helped him to better connect with clients:

> It was in-home robbery, but they knocked it down to burglary. I was 11 years old. And from that time, I had kept on getting in trouble. I was never offered alcohol and drug treatment until I was 24 years old. That's my experience with 'em… When I work with the kids—there's kids that are 16, 17, no foster homes or group homes would take them, and they're homeless. And when they say, "I don't know where I'm going to get my next meal," I say, "I remember that. That sucks." And they say, "You don't—you never did that." And I said, "Oh, really? So, you never had to do this, this, and this?" And they're like, "Oh shit, you do know." Right? So now it's a strength. It's a gift.

Discussion

The aim of this study was to understand participants' perspectives of (a) how early life experiences and development influenced later addiction and recovery, and (b) how experiences shaped relationships with family, peers, and communities over time. The life course perspective helps underscore the significance of early-life experiences and trauma in the choices and behaviors of the individual later in life (Hser et al., 2007).

This study showed how participants believed early childhood experiences and family of origin shaped susceptibility to addiction. A few of the individuals in this study's sample suggested the possibility that they were born with the "disease of addiction," and that viewing their situation in that way has allowed them to understand and control their behavior. Regardless of the biological inheritance, children who experienced family substance abuse as a model for coping strategies were more likely to abuse drugs than those who did not (Hawkins et al., 1992). Further, research suggested that familiarity with substance use as coping, combined with traumatic early-childhood experiences at the hands of a caregiver, increased the individual's susceptibility to substance dependence later in life (Hawkins et al., 1992; Hser et al., 2007). In this sample, participants reported similar risk factors and also believed that those factors did indeed contribute to their later addiction.

Those who lack healthy support and coping methods in the home typically need resources in their social environment. Unfortunately, when participants were instead met with bullying and/or perceptions of social rejection, participants reported that feelings of loneliness and rejection were exacerbated. Participants in this study had the common characteristic of eventually assimilating into peer groups that introduced and encouraged drug use. Participants saw how the combined effect of finally finding the emotional support of a peer group as well as the introduction of substances contributed to their addiction, which is consistent with existing research (Dishion, McCord, & Poulin, 1999).

Another common theme among participants was the phenomenon of "liking it instantly," during the initial use of heroin or their first experience with drugs in general. With a childhood and adolescence filled with rejection, stress, and trauma, these individuals had finally found something that instantly and consistently brought feelings of happiness and freedom from worry. The nature of addiction requires increased doses to induce intoxication, and a base dose will simply allow them to achieve their new state of "normal."

Because of the extreme addictiveness of heroin, the onset of increased tolerance, withdrawal symptoms, and negative interpersonal consequences may be rapid ("National Drug Strategy," 2013). For this study, the interpersonal consequences were that any family and friend relationships not related to drug use were no longer pursued. Marco's previous comments about the nature of his relationships during addiction lend important insight into this phenomenon. For this study's sample, any emotional energy invested in existing relationships tended to be volatile, while any new peer connections were mainly formed in the drug community, further reinforcing the lifestyle of the user. As their dependence progressed, the user described how they became increasingly emotionally distant. Poverty, crime, arrests, and time spent in prison all were consequences experienced by participants that can lead to high community costs (Mark et al., 2001).

Successful recovery typically entails changes to

individual social support systems, including peers, family, and the community (Havassy, Hall, & Wasserman, 1991; Hser et al., 2007). For participants, the friendships held at the beginning of treatment ultimately were abandoned, as they were developed within the drug community, and deemed detrimental to positive treatment and recovery outcomes. Instead, new friendships were formed in treatment and support groups like Alcoholics Anonymous (AA) and Narcotics Anonymous (NA) with peers who were able to relate to what participants were going through and hoping to change. Participants expressed that the ability to support one another in this endeavor and continue that support after treatment helped strengthen the friendship and reinforce sobriety.

Participants experienced family relationships as changing over time. Initially, they were volatile, which decreased over time as the individual continued in his or her dependence and isolated from family, and then improved upon treatment and recovery. However, participants lamented that issues surrounding family relationships were not easily overcome, even with successful treatment and improvements in participants' health and lifestyle afterward. Often, these relationships, especially those with parents, were what contributed to the development of addiction. 12-Step programs often expect that individuals make amends with family members ("Step 9," 2014), which participants believed helped them create a new sense of civility in the parent-child relationship.

Substance-dependent individuals who can find a way to contribute to their communities upon completion of treatment, like those in this sample, may report gaining a different sense of meaning, purpose, and worth through these helping activities. Participants were all using their past addiction and recovery experiences to help others struggling with drug addiction. Given the role of social support systems in recovery (Havassy et al., 1991), contributing to the community may also play a role in the continuation of one's sobriety. As indicated in these narratives, keeping up one's sense of self-worth and self-esteem through activities that give back to the community may be instrumental in continued recovery.

Future research should consider the need for prevention efforts during childhood and adolescence. This study presented various early risk factors for later-life development of substance dependence: parental substance abuse; physical, emotional, or sexual abuse; and isolation and/or rejection from peers. With school programs to identify these factors in children, better support can be offered outside of the home. Future research should also consider comprehensive support for the family unit of children identified with these risk factors. It is likely that parents of these at-risk children have similar backgrounds of the participants presented in this study. If they are receptive to learning new coping techniques and seeking their own treatment for any substance abuse, a family treatment plan may be effective in improving the health of the entire family unit. Lastly, future research should examine the individual differences of those in treatment and recovery. It is important to understand the common and unique characteristics of heroin addiction and recovery.

A major limitation of this study was how the sample was drawn. These participants were staff members at one treatment agency. A more diverse sample of participants—specifically some who are not currently employed at a recovery agency—would help to better understand community relationships after treatment. It may be that the role of community contributions is unique to this sample, and it may not generalize to the recovery population as a whole. Another limitation was the developing expertise of the first author in interviewing participants. For instance, the first interview contained the least amount of data for analysis, and subsequent interviews were lengthened. Pilot interviews may be needed to help novice researchers improve interview skills.

The goal of this study was to understand heroin addiction by examining the personal narratives of those who had lived through it and are now well into their recovery. It is important to understand that participants reflected that their experiences of significant trauma combined with substance abuse as a model for coping, were influential in the development of later-life addiction. Participants experienced the trajectories of their relationships with friends, family, and communities as tied directly to their stage of addiction. In other words, the deeper they went into dependence, the more relationships suffered. Conversely, the longer they sustained recovery, their own well-being and relationships improved. Continued investigations are needed to understand how the life course perspective may further our understanding of risks for and recovery from drug dependence.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Berg, B. (2008). *Qualitative research methods for the social sciences* (7th ed.). New York: Pearson.

Cheng, J., Lu, Y., Han, X., Gonzalez-Vallejo, C., & Sui, N. (2012). Temporal discounting in heroin-dependent

patients: No sign effect, weaker magnitude effect, and the relationship with inhibitory control. *Experimental and Clinical Psychopharmacology*, *20*, 400-409. doi: 10.1037/a0029657

Connidis, I. A. (2001). *Family ties & aging*. Thousand Oaks, CA: Sage Publications.

Dishion, T., Mccord, J., & Poulin, F. (1999). When interventions harm: Peer groups and problem behavior. *American Psychologist, 54*, 755-764. doi: 10.1037/0003-066X.54.9.755

Fulton, R. (1999). The stigma of substance use: A review of the literature. A report submitted to the committee on stigma and addiction at the Centre for Addiction and Mental Health.

Havassy, B. E., Hall, S. M., Wasserman, D. A. (1991). Social support and relapse: Commonalities among alcoholics, opiate users, and cigarette smokers. *Addictive Behaviors, 16,* 235-246. doi:10.1016/0306-4603(91)90016-B

Hawkins, J., Catalano, R., & Miller, J. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin, 112*, 64-105.

Hedges, K. E. (2012). A family affair: Contextual accounts from addicted youth growing up in substance using families. *Journal of Youth Studies, 15,* 257-272. doi: 10.1080/13676261.2011.635194

Higgs, P., Jordens, J., Maher, L., & Dunlop, A. (2009). Vietnamese-Australian heroin users' perspectives on the role of the family in treatment. *Drugs: Education, Prevention, and Policy*, *16*, 409-421. doi: 10.1080/09687630802063623

Hser, Y., Longshore, D., & Anglin, M. (2007). The life course perspective on drug use: A conceptual framework for understanding drug use trajectories. *Evaluation Review, 31*, 515-547. doi: 10.1177/0193841X07307316

Luoma, J. B., Twohig, M. P., Waltz, T., Hayes, S. C., Roget, N., Padilla, M., & Fisher, G. (2007). An investigation of stigma in individuals receiving treatment for substance abuse and stigma for those in treatment. *Addictive Behaviors, 32,* 1331-1346. doi:10.1016/j.addbeh.2006.09.008

Mark, T. L., Woody, G., Juday, T., & Kleber, H. D. (2001). The economic cost of heroin addiction in the United States. *Drug and Alcohol Dependence*, *61*, 195-206. doi: 10.1016/S0376-8716(00)00162-9

Morrow, S. L., & Smith, M. L. (2000). Qualitative research for counseling psychology. In S. D. Brown & R. W. Lent (Eds.), *Handbook of Counseling Psychology* (3rd ed., pp. 199-230). New York: Wiley.

National Drug Strategy (2013). *Guidelines for the management of heroin withdrawal.* Retrieved September 23, 2014 from http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/9011C92D2F6E1FC5CA2575B4001353B6/$File/bupren4.pdf

Neale, J., Allen, D., & Coombes, L. (2005). Qualitative research methods within the addictions. *Addiction, 100,* 1584–1593. doi: 10.1111/j.1360-0443.2005.01230.x

Ross, J., Teesson, M., Darke, S., Lynskey, M., Ali, R., Ritter, A. & Cooke, R. (2004). *Twelve month outcomes of treatment for heroin dependence: Findings from the Australian treatment outcome student*. Sydney: National Drug and Alcohol Research Centre.

Simmons, J., & Singer, M. (2006). I love you... and heroin: Care and collusion among drug-using couples. *Substance Abuse Treatment, Prevention, and Policy*, *1*, doi: 10.1186/1747-597X-1-7

Step 9. (2014, January 1). Retrieved September 25, 2014 from http://www.aa.org/assets/en_US/en_step9.pdf

Substance Abuse and Mental Health Services Administration. (2011). *Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings*. Retrieved September 21, 2014 from http://www.samhsa.gov/data/nsduh/2k11results/nsduhresults 2011.pdf

Vaillant, G. (1988). What can long-term follow-up teach us about relapse and prevention of relapse in addiction? *British Journal of Addiction*, *83*, 1147-1157. doi: 10.1111/j.1360-0443.1988.tb03021.x

Van Zyl, J.I. (2007). *The meaning of heroin addiction: A phenomenological study.* (Master's Thesis). University of South Africa. Retrieved from http://uir.unisa.ac.za/bitstream/handle/10500/1364/dissertation.pdf?sequence=1

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Directional Preference in *Drosophila melanogaster*

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Diverse organisms have been shown to use the Earth's magnetic field for orientation and navigation, but the mechanisms underlying magnetoreception are still poorly understood. Recent research on magnetoreception has focused on the fruit fly *Drosophila melanogaster* primarily because of its role as a model organism for understanding the genetic mechanisms underlying behavioral traits. While current research suggests that *Drosophila* might be able to detect and orient to magnetic fields, different studies offer contradictory results. In this study, we used a Y-maze and selective breeding to attempt to create a population of fruit flies that display a robust magnetic orientation behavior. We used a Y-maze where each fly made 10 choices of whether to go north or south. Of flies that exited the maze, we selected the top 20% of flies from each run to produce the next generation. This protocol was repeated for 12 generations. Our data shows that wild-type *Drosophila* have no innate north or south preference, nor an innate east or west preference. Additionally, after 12 generations of selection, we have so far been unable to create populations of fruit flies with a magnetic orientation behavior. Further research includes continued selection on our current populations of flies as well as experimental design modifications that could possibly detect a more subtle magnetic orientation behavior.

Keywords: Drosophila melanogaster, magnetoreception, directional preference

Introduction

The use of the Earth's magnetic field for orientation was first described in birds and helped explain their ability to migrate and navigate long distances (Kramer, 1953). Research has since shown that the use of the Earth's magnetic field for orientation and navigation is quite widespread in the animal kingdom, and includes almost every class of vertebrates and many invertebrates (Wiltschko and Wiltschko, 1995). Moreover, magnetic field orientation has been found not only in organisms that undergo long distance migrations crossing many miles, but also organisms that do not move long distances such as the eastern red-spotted newt *Notophthalmus viridescens* (Phillips and Borland, 1992), the mole rat *Cryptomys hottentotus* (Burda *et al.*, 1990), and the leafcutter ant *Atta columbica* (Banks and Srygley, 2003). However, despite the prevalence of magnetic orientation in animals, the mechanisms underlying this ability are still poorly understood (Gegear *et al.*, 2008).

Currently, the two prevailing hypotheses regarding magnetoreception in animals are the magnetite model and the radical pair model. The magnetite model proposes that there are permanently magnetic microscopic particles that are associated with specific sensory neurons, allowing for orientation (Gegear *et al.*, 2008). The radical pair model is light-dependent and involves unpaired electrons whose spins are affected by magnetic fields (Philips and Sayeed, 1993). Evidence that animals use one of these systems does not mean that other animals do not use the other system. In fact, there is evidence that both light-dependent magnetoreception and magnetite-based magnetoreception are both used by individuals of certain species. For example, experimental evidence indicates that the mealworm *Tenebrio molitor* (Arendse, 1978; Vacha and Soukopova, 2004) and the monarch butterfly *Danaus plexippus* (Perez *et al.*, 1999; Guerra *et al.*, 2014) each have light-based and magnetite-based magnetoreception.

Several studies have suggested that the fruit fly *Drosophila melanogaster* also possesses the ability to orient using magnetic fields (Philips and Sayeed, 1993; Gegear *et al.*, 2008; Dommer *et al.*, 2008). The potential

magnetic orientation ability of *Drosophila* is particularly exciting because the fruit fly is an exceptionally useful genetic model for the study of behaviors (Sokolowski *et al*., 1984). If it is shown that *Drosophila* do in fact use magnetotaxis to orient and navigate, we will be able to further understand the genetic mechanisms behind this ability and apply it to other, more complex organisms, including mammals.

Thus far, the evidence that *Drosophila* use Earth-strength magnetic fields to orient is suggestive, but different studies have shown conflicting results. For example, adult female fruit flies were shown to orient using Earth-strength magnetic fields in one study (Gegear *et al*., 2008), but not in another (Phillips and Sayeed, 1993). Similarly, *Drosophila* larvae were shown to have innate directional preferences in one study (Painter *et al*., 2013), but not in another (Dommer *et al*., 2008). We predict that if *Drosophila* have the ability to orient using Earth-strength magnetic fields, we should be able to create robust lines of flies with predictable directional preferences using a selective breeding protocol.

Methods

To test directional preferences in *Drosophila*, we designed a sequential Y-maze, similar to a maze that was previously used to study phototaxis in *Drosophila* (Hadler, 1964). We first ran a wild-caught population of flies through the maze to determine if flies had an innate preference for north or south. We then selectively bred the flies to create one population of north-selected flies and a second population of south-selected flies. As a positive control, we also performed an experiment to test the phototaxic orientation behavior of wild-caught and selectively bred flies. While we plan to continue our experiment for 15 generations, we have preliminary results for our experiment after 12 generations.

Our wild population of *Drosophila* (Generation 0), was collected from a composting site in Monmouth, OR, USA. This generation was kept and proliferated in the lab for all Generation 0 experiments. Flies were maintained in a 12h:12h light:dark cycle at 25°C on standard dextrose medium supplemented with 0.1% Nipagen to inhibit mold.

The ambient magnetic field in the room where we conducted the experiments was 42 μT, as measured with the iPhone app Magnetometer by Kory Hearn Software. The normal strength of the magnetic field in Monmouth, OR, is approximately 52 μT (NOAA National Centers for Environmental Information). In order to select flies with a specific directional preference, we designed a maze that would require the flies to make a choice between two directions. This was accomplished through a progressive Y-maze (Figure 1), where each fly made 10 sequential choices to go right or left based on available environmental cues. Thus, each vial was assigned a number for data collection purposes, zero being the resulting vial when the fly made zero choices to go towards the given cue for that week. The environmental cues available were either North vs. South, West vs. East, or Light vs. Dark.

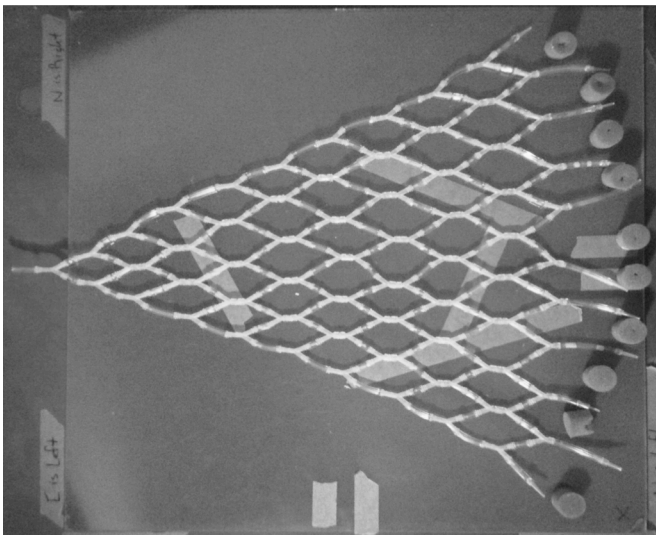

Figure 1: The sequential Y-maze used to determine light and directional preferences. Flies were released into the tube on the left side of the image. The maze exits are on the right side of the image. The foam stoppers used for the collection vials are also visible on the right side of the image.

The Y-maze was made out of plastic tubing with an outer diameter of 3/16" and connecting 3/16" aquatic air filter connectors. Standard plastic pipette tips were cut and inserted into the Y-connectors to prevent flies from back-tracking once a decision was made. The beginning and ends of the maze were fitted with foam stoppers punctured by the plastic pipettes. These foam stoppers allowed connection to collection vials that would hold flies after each trial until they were counted. The collection vials were filled with food to encourage flies to finish the maze and maintain the flies until counting. The beginning vial did not contain any food and was covered with aluminum foil to block light and encourage flies to leave the starting vial.

For our north vs. south experimental flies, we set up the maze so that choosing north or south was the same as a right or left choice (Figure 2). Which direction was north or south was determined randomly for each week of experimental runs. If the week was a "right" week, we

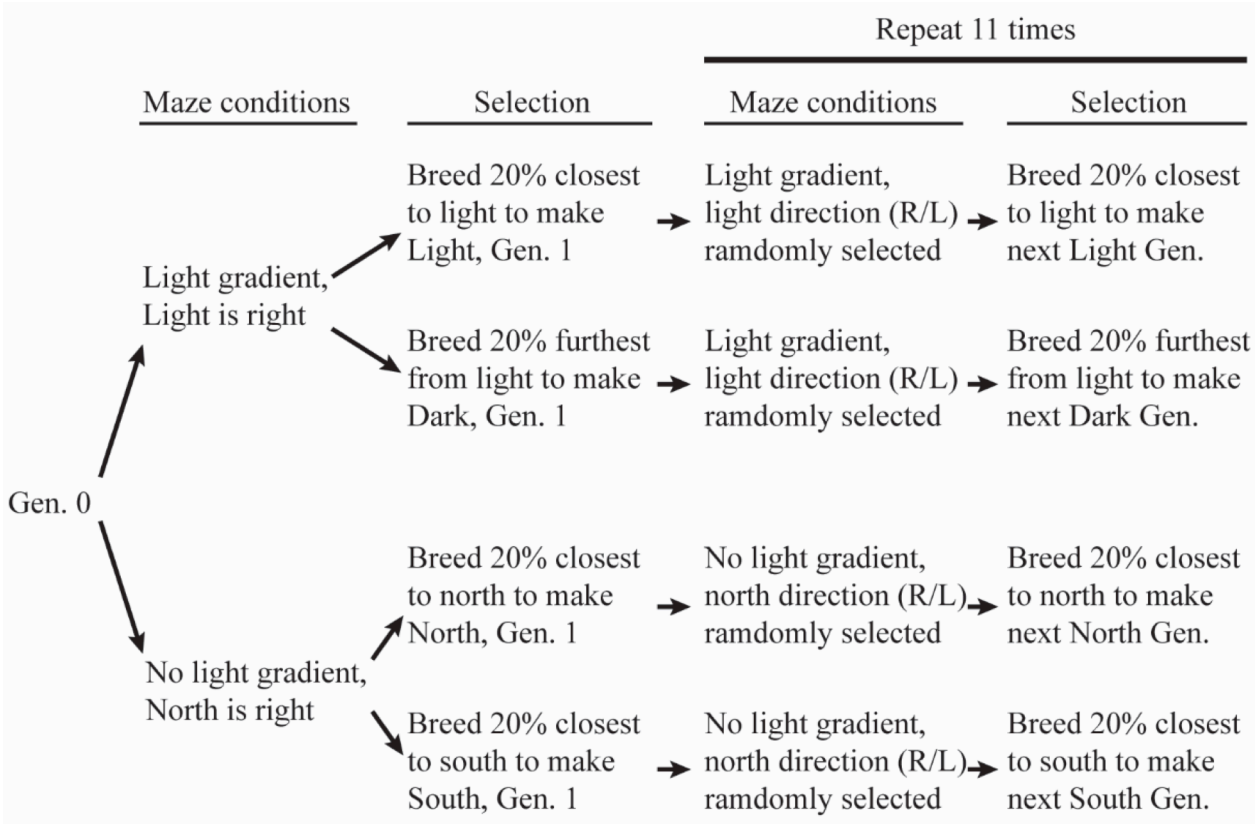

Figure 2: A flow chart of the artificial selection protocol. "Gen. 0", or generation 0, is the original population of flies. R is right, L is left.

turned the maze so that by going right the flies were going north. If the week was a "left" week, we turned the maze so that by going right the flies were going south. Two 40 W desk lamps, directed upward, were used to create the ambient light for each run. A fluorescent plastic light diffuser sheet was placed over top of the maze to ensure a smooth light gradient. We also performed a trial where the Generation 0 flies made east vs. west choices, rather than north vs. south.

In our positive experimental control, we used a similar protocol as described above except that we added a light gradient. To ensure a smooth light gradient a fluorescent plastic light diffuser sheet was placed in front of the light. The light was produced via a 40 W desk lamp with a flexible neck to allow for proper directing of the light.

After each run through the maze, we anesthetized the flies with CO2 and counted the number of flies in each vial. Each successive generation was created by taking the top 20% of the flies collected from each run through the maze. For example, for a trial with the "North" population of flies where the north-most vial was vial 10, if 100 flies completed the maze with 2 flies in vial 10 and 30 flies in vial 9, we bred the 2 flies from vial 10 and 18 of the 30 flies from vial 9. The same procedure was used for the "South", "Light", and "Dark" populations of flies. The researchers setting up the experiment and collecting the flies were blind to which population of flies were being used in a given trial. In between runs, we allowed 2-3 weeks for breeding of each generation. During off-weeks when flies were breeding, the maze was cleaned with tap water and allowed to air dry until the next use.

To determine whether our wild-caught flies had an innate preference for light or dark and north or south, we performed 4 initial trials with Generation 0 flies: 1) the right side of the maze was light and the left side was dark; 2) the right side of the maze was north; 3) the left side of the maze was north; 4) the right side of the maze was west. Generation 12 also consisted of 4 trials: one trial each for the Light flies, the Dark flies, the North flies, and the South flies. For the Light and Dark trials, light was on the right side of the maze. For the North and South trials, north was on the right side of the maze. We compared the results of these eight trials using an ANOVA with post-hoc t-tests in Microsoft Excel (Microsoft Corporation, Redmond, WA).

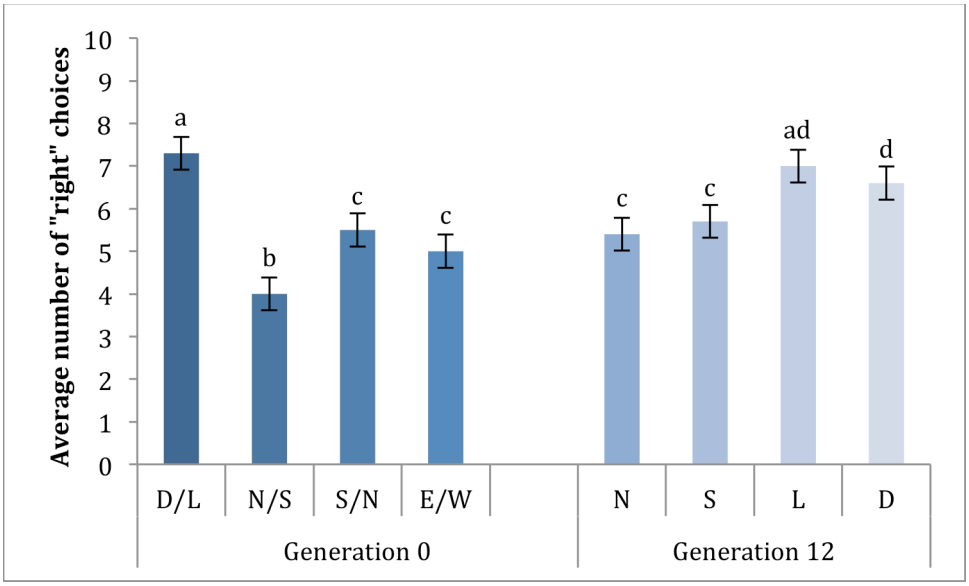

Figure 3: Average number of choices toward the right side of the maze for the original population of flies (Generation 0), and flies after 12 rounds of selection (Generation 12). D/L represents the dark vs. light trial with the light side of the maze toward the right (n = 98). N/S represents the north vs. south trial with south to the right (n = 47). S/N represents the north vs. south trial with north to the right (n = 66). E/W represented the east vs. west trial with west to the right (n = 46). For Generation 12, N represents north-selected flies (n = 91), S represents south-selected flies (n = 155), L represents light-selected flies (n = 58), and D represents dark-selected flies (n = 61). For north vs. south trials, north was to the right. For light vs. dark trials, light was to the right. Bars with similar letters are not significantly different (post-hoc t-tests; $p < 0.05$). Error bars represent standard error of the mean.

Fruit flies are known to recognize each other and regulate their behavior accordingly (Yurkovic et al., 2006; Krupp et al., 2008). As flies move through our maze, they are likely to interact. Therefore, each fly completing the maze is not an independent data point. To address this pseudoreplication, for the Generation 12 North and South flies we performed a second experiment with both populations. After the flies completed the maze, we again collected the top 20% of flies. However, rather than breeding these flies, we ran the flies through the maze a second time. If the top 20% of flies had a directional preference, they should show that directional preference again on the 2nd run through the maze. If the top 20% were determined stochastically, they should show no directional preference on the 2nd run. Results were compared using unpaired t-tests in Microsoft Excel.Fruit flies are known to recognize each other and regulate their behavior accordingly (Yurkovic et al., 2006; Krupp et al., 2008). As flies move through our maze, they are likely to interact. Therefore, each fly completing the maze is not an independent data point. To address this pseudoreplication, for the Generation 12 North and South flies we performed a second experiment with both populations. After the flies completed the maze, we again collected the top 20% of flies. However, rather than breeding these flies, we ran the flies through the maze a second time. If the top 20% of flies had a directional preference, they should show that directional preference again on the 2nd run through the maze. If the top 20% were determined stochastically, they should show no directional preference on the 2nd run. Results were compared using unpaired t-tests in Microsoft Excel.

Results

We found the maze conditions had a significant effect on the distribution of flies in the collection vials (Figure 3; ANOVA: $F_{7, 614} = 19.07$; $p < 0.001$). The flies in the generation 0 Light/Dark trial had a mean vial number of 7.3 ± 0.2 (± S.E.M.), which was significantly different from all other Generation 0 trials (t-tests: north to the right: $p < 0.001$; north to the left: $p < 0.001$; west to the right: $p < 0.001$). In generation 0, the distribution of flies from the maze where north was to the left (4.0 ± 0.2) had a significantly different distribution compared to flies from the maze where north was to the right (5.5 ± 0.3; t-test: $p < 0.001$) and compared to flies from the maze where west was to the right (5.0 ± 0.3; t-test: $p = 0.016$).

There was not an obvious change in orientation behavior due to selective breeding for our Light, North or South populations; however there does appear to be a change in behavior for our Dark population (Figure 3; Figure 4). After 12 generations of selection, the Light flies did not have a different distribution (7.0 ± 0.2) from the Generation 0 flies (t-test: $p < 0.24$). The Dark flies (6.6 ± 0.3) were significantly different from the Generation 0 flies (t-test: $p = 0.019$). The North flies (5.4

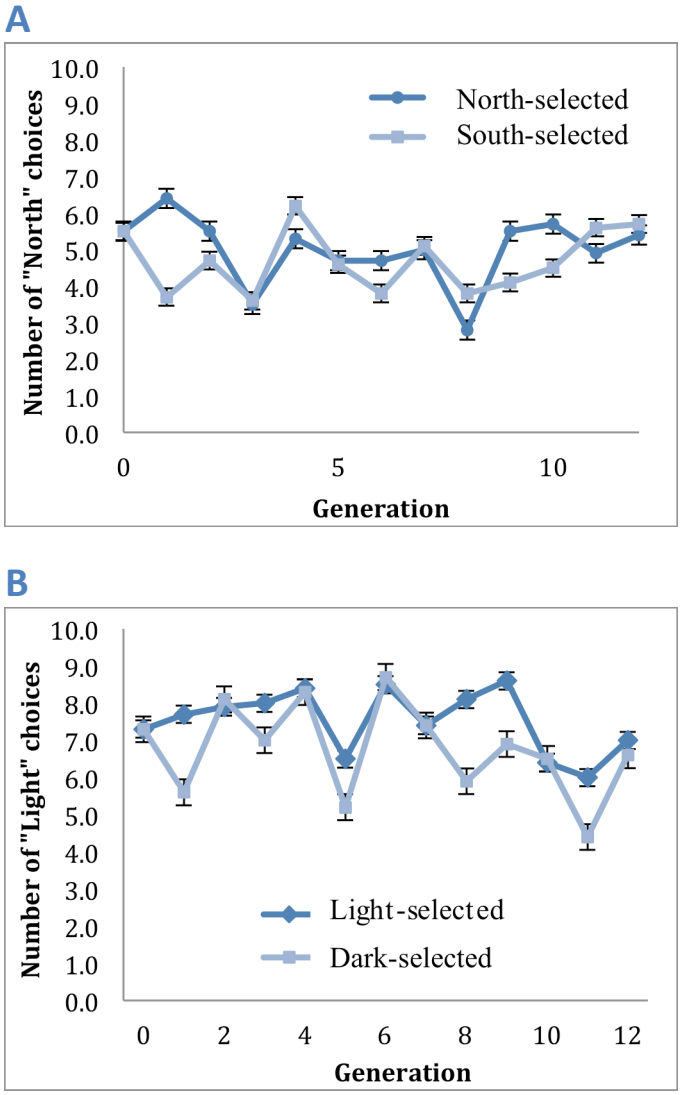

Figure 4: The average number of (A) "North" or (B) "Light" choices made by each generation of flies after artificial breeding for each direction preference. Error bars represent standard error of the mean.

± 0.2) were not different from the Generation 0 flies when North was to the right (t-test: p = 0.90). The South flies (5.7 ± 0.2) were also not different from the Generation 0 flies when North was to the right (t-test: p = 0.36).

The overall distribution of Generation 12 flies, both south-selected and north-selected, did not appear to be a normal distribution (Figure 5). For example, if the flies had a normal distribution with an average of 5.5, we would expect that vials 5 and 6 would have the most flies, and the numbers of flies in each vial would decrease as the vial number increased. However, for the South Generation 12 flies, 19% of flies were found in vial 7, 7% were in vial 8, and 16% were in vial 9. Similarly, in trial with North Generation 12 flies, 6% of flies were found in vial 6 and 14% were in vial 7.

We performed an additional experiment with the generation 12 North and South flies where we ran the flies through the maze, collected the top 20% of flies, and then ran them through the maze again. For the North flies, the average distribution on the original run through the maze (n = 308; 5.6 ± 0.1) was not different from the average distribution when the top 20% of flies were re-run through the maze (n = 53; 5.1 ± 0.3; t-test: p = 0.15). Similarly, for the South flies, the average distribution for the original run (n = 95; 4.0 ± 0.2) was not different from the average distribution when the top 20% were re-run through the maze (n = 17; 4.1 ± 0.4; t-test: p = 0.94).

Discussion

Our two trials of north vs. south with Generation 0 flies were significantly different from the light vs. dark trial with Generation 0, consistent with previous findings that flies have an innate phototaxic behavior (Hadler, 1964). However, while previous research saw a significant separation between Light and Dark populations of flies by Generation 10 (Hadler, 1964), after 12 generations we have only seen a significant difference in the Dark population compared to our wild-caught population. The difference may be due to the fact that in Hadler (1964) the original wild-caught flies scored an average of 8.2 out of 15, whereas our wild-caught flies scored an average of 7.3 out of 10. The wild-caught flies in Hadler (1964) were 0.7 choices away from the center photo-score and our flies were 2.3 choices from the center photo-score. Using these innately stronger phototaxic flies may have led to a ceiling effect for our light-selected flies and may be contributing to our slow separation of populations.

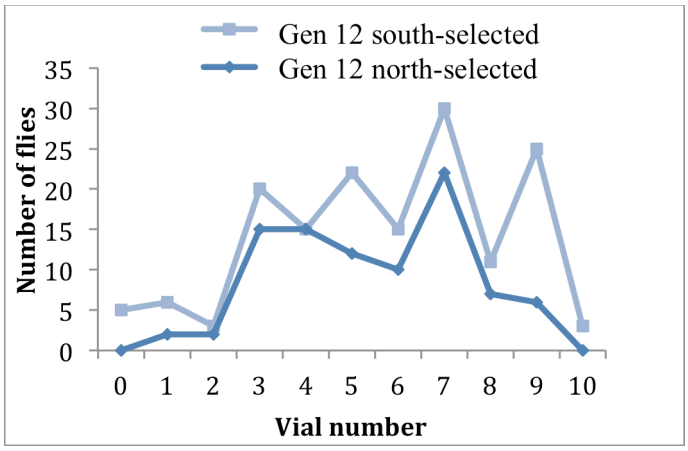

Figure 5: Number of flies in each vial for Generation 12 of the north-selected and south-selected populations.

Our initial trials with the wild-caught *Drosophila* are suggestive that the flies may have an innate directional preference for north over south. The distribution of flies in the trial when north was to the right was significantly different than the distribution of flies when north was to the left (Figure 3). However, two additional sets of experimental data do not support this initial finding. First, after 12 generations of selection, the North population and the South population of flies showed no difference in their orientation behavior. Second, when we re-ran the top 20% of the Generation 12 North flies and the top 20% of the Generation 12 South flies through the maze a second time, there was no significant difference between the directional preferences of the entire population of generation 12 flies and the top 20% of Generation 12 flies for either the North or South populations.

Our future plans include breeding the flies through 15 generations of selection, then performing multiple replicates of the Generation 0 and Generation 15 flies. Because our flies are in the maze together, each fly should not be considered an independent data point. Indeed, the distribution of our flies in the maze show clumping of flies in certain vials (Figure 5), indicating that the flies are interacting as they run through the maze. Performing replicates with the Generation 0 and Generation 15 flies will allow us to treat each group of flies that run through the maze as independent data points.

We also plan to begin a new round of breeding, using wild-caught Generation 0 flies, with a Faraday cage around our maze. If flies use cryptochrome to detect magnetic fields, we may have failed to observe orientation behavior because of ambient radio frequency fields (Phillips and Sayeed, 1993). We chose to run our initial experiments without a Faraday cage because a Faraday cage will not affect magnetite-based magnetoreception. Evidence suggests that at least eight genera of arthropods use magnetite to detect magnetic fields, while evidence for using light-based magnetoreception has only been found in 4 genera (Arendse, 1978; Leucht, 1984; Anderson and Vander Meer, 1993; Collett and Baron, 1994; Chittka *et al.*, 1999; Perez *et al*., 1999; Vacha and Soukopova, 2004; Camlitepe *et al.*, 2005; Gegear *et al.*, 2008; Guerra *et al.*, 2014; Riveros *et al.*, 2014). Of the four genera that appear to use light-based magnetoreception, all except *Drosophila* use both magnetite and a light-based mechanism. If we can selectively breed north-seeking *Drosophila* with a Faraday cage, but cannot successfully breed them without a Faraday cage, this would be further evidence that *Drosophila*, unlike all other arthropods tested so far, have only light-based magnetoreception.

If we ultimately confirm that *Drosophila* do indeed have a magnetic orientation behavior, the method of using a Y-maze coupled with selective breeding that we describe here should facilitate our understanding of the genetic basis of magnetic orientation behavior. For example, since the demonstration that *Drosophila* have innate positive phototaxis behavior (Hadler, 1964), subsequent genetic analysis has shown that the genes regulating photonegative behavior in *Drosophila* reside in the X chromosome and that genes for photopositive behavior are largely autosomal (Markow 1975). The use of a Y-maze by Hadler (1964), along with selective breeding, allowed for further exploration of the actual genetic basis for their behavior. Our goal is similar: to not only supplement the data that demonstrate magnetic orientation behavior in *Drosophila*, but to ultimately generate a strain of flies that can be used to find the genetic basis for magnetic orientation in *Drosophila*. Overall, we hope this will lead to further understanding of the genetic basis for migration behavior and orientation in a wide variety of organisms.

References

Anderson JB, Vander Meer RK (1993) Magnetic orientation in the fire ant, *Solenopsis invicta*. Naturwissenschaften 80: 568-570.

Arendse MC (1978) Magnetic field detection is distinct from light detection in the invertebrates *Tenebrio* and *Talitrus*. Nature 274: 357-362.

Banks AN, Srygley RB (2003) Orientation by magnetic field in leaf-cutter ants, *Atta colombica* (Hymenoptera: Formicidae) Ethology. 109: 835-846.

Burda H, Marhold S, Westenberger T, Wiltschko R, Wiltschko W (1990) Magnetic compass in the subterranean rodent *Cryptomyshottentotus* (Bathyergidae) Experientia 46: 528–530.

Camlitepe Y, Aksoy V, Uren N, Yilma A, Becenen I (2005) An experimental analysis on the magnetic field sensitivity of the black-meadow ant *Formica pratensis Retzius* (Hymenoptera: Formicidae). Acta Biol Hung 56: 215-224.

Chittka L, Williams NM, Rasmussen H, Thomson, JD (1999) Navigation without vision: bumblebee orientation in complete darkness. P Roy Soc Lon B Bio 266:45-50.

Collett TS, Baron J (1994) Biological compasses and the coordinate frame of landmark memories in honeybees. Nature 368: 137-140.

Dommer DH, Gazzolo PJ, Painter MS, Phillips JB (2008) Magnetic compass orientation by larval *Drosophila melanogaster*. J Insect Physiol 54: 719–726.

Fedele G, Green EW, Rosato E, Kyriacou CP (2014) An electromagnetic field disrupts negative geotaxis *in Drosophila* via a CRY-dependent pathway. Nature Communications 5: 4391.

Gegear RJ, Casselman A, Waddell S, Reppert SM (2008) Cryptochrome mediates light-dependent magnetosensitivity in *Drosophila*. Nature 454: 1014–1018.

Guerra PA, Gegear RJ, Reppert SM (2014) A magnetic compass aids monarch butterfly migration. Nature Communications 5: 4164-4171.

Hadler NM (1964) Genetic influence on phototaxis in *Drosophila melanogaster*. Biol Bull 126: 264–273.

Kramer, G (1953) Wird die Sonnenhohe bei der Heimfindeorientierung verwertet? J. Ornithol. 94: 201–219.

Krupp JJ, Kent C, Billeter JC, Azanchi R, So AK, Schonfeld JA, Smith BP, Lucas C, Levine JD (2008) Social experience modifies pheromone expression and mating behavior in male *Drosophila melanogaster*. Curr Biol 18:1373–1383.

Leucht T (1984) Responses to light under varying magnetic conditions in the honeybee, *Apis mellifica*. J Comp Physiol A 154: 865-870.

Markow, TA (1975) A genetic analysis of phototactic behavior in *Drosophila melanogaster*. I. Selection in the presence of inversions. Genetics 79: 527–534

Marley R, Giachello CNG, Scrutton NS, Baines RA, Jones AR (2014) Cryptochrome-dependent magnetic field effect on seizure response in *Drosophila* larvae. Sci Rep 4: 5799.

NOAA National Centers for Environmental Information. Computer Earth's Magnetic Field Values. https://www.ngdc.noaa.gov/geomag/magfield.shtml.

Painter MS, Dommer DH, Altizer WW, Muheim R, Phillips JB (2013) Spontaneous magnetic orientation in larval *Drosophila* shares properties with learned magnetic compass responses in adult flies and mice. J Exp Biol 216: 1307-1316.

Perez SM, Taylor OR, Jander R (1999) The effect of a strong magnetic field on monarch butterfly (*Danaus plexippus*) migratory behavior. Naturwissenschaften 86: 140-143.

Phillips JB, Sayeed O (1993) Wavelength-dependent effects of light on magnetic compass orientation in *Drosophila melanogaster*. J Comp Physiol A 172: 303-308.

Phillips JB, Borland SC (1992) Behavioral evidence for the use of a light-dependent magnetoreception mechanism by a vertebrate. Nature 359: 142–144.

Riveros AJ, Esquivel DMS, Wajnberg E, Srygley RB (2014) Do leaf-cutter ants *Atta colombica* obtain their magnetic sensors from soil? Behav Ecol Sociobiol 68: 55-62.

Sokolowski MB, Kent C, Wong J (1984) *Drosophila* larval foraging behaviour: developmental stages. Animal Behavior 32: 645–651.

Vacha M, Soukopova H (2004) Magnetic orientation in the mealworm beetle *Tenebrio* and the effect of light. J Exp Biol 207: 1241-1248.

Wiltschko R, Wiltschko W (1995) Magnetic Orientation in Animals. Springer, Berlin, Heidelberg, New York.

Wiltschko W, Wiltschko R (2005) Magnetic orientation and magnetoreception in birds and other animals. J Comp Physiol A 191: 675-693.

Yurkovic A, Wang O, Basu AC, Kravitz EA (2006) Learning and memory associated with aggression in *Drosophila melanogaster*. Proc Natl Acad Sci USA 103:17519–17524.

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Prehistoric Incentives to High Altitude Settlement in Wyoming's Wind River Range

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Villages in Wyoming's Wind River Range (inhabited ca. 4000-420 BP) exhibit patterning that indicates reliance on specific lithic resources, white bark pine, and traditional game. These villages were occupied in the warmer months as part of a seasonal migration pattern that was enhanced and accommodated by an early onset of the Medieval Warming Period in the region. The resources that motivated the settlement of these mountains conflict with preconceptions of scarcity in the alpine and sub-alpine environments. This research seeks to inform future assessments of a locality's potential to hold significant archaeological sites.

Keywords: prehistoric settlements, Wyoming, Altitude

Introduction

In the frost-capped mountains of Wyoming's Wind River Range archaeologists have uncovered a series of nineteen villages at the lower limits of the alpine ecotone, in excess of 10,000 feet above sea level (Fig. 1). The 2003 to 2011 discoveries of these villages (Stirn 2014:524) and subsequent research by archaeologists directed by Matthew Stirn has provoked the curiosity of many, prompting high-altitude tourist expeditions that frequent the Wind River Range with questions. The distance that modern society has put between ourselves and the environment seems to have granted the mountains a level of both mystery and romance that colors our perspective. The widespread question from naturally intrigued parties is "why here?"

In answering this question there are two schools of thought, the generally opposed concepts of push vs. pull. Motivations for alpine settlement can easily be assumed to be the result of a push resulting from low-land scarcities. Drought and lack of traditional game, for example, are common stimuli for migration. This assumption is also influenced by the previously mentioned mystery of the mountains and their perceived marginal capacity to sustain a significant population. Contrary to these assumptions, the high elevation and landscape of the Wind River Range provided tremendous benefits that pulled the Shoshone ancestors to occupy the Wind River villages.

Sites

Of the Wind River villages, the best documented site is High Rise Village discovered in 2006 (Morgan et al. 2012:40), containing over seventy cut and fill lodge pads. The impressive assemblage of artifacts bears traits typical of the Numic Mountain Shoshone (Stirn 2014:524). This expansive site covers an impressive nineteen acres, extending from above into the modern tree line on a 23° south facing slope, allowing the occupants to exploit resources of two biomes (Morgan et al. 2012:36). The Mountain Shoshone historically occupied the Wind River Range into the 1800s, moving seasonally, settling in the lowlands during the winter months and the mountains in the summer (Adams 2006).

Sites in the Wind River Range cover a temporal range of 4,000 to 420 BP (Stirn 2014), making High Rise Village among the oldest and most expansive high-altitude settlements in North America, and at an elevation several thousand feet higher than Peru's Machu Picchu. However, dating the site is not without its difficulties, as the occupants commonly burned older wood sources of up to 900 years in age. This coupled with the 700 year lifespan of whitebark pine suggests that the precision of dating could be off by as much as 1500 years (Morgan et al. 2012:53). Dating at this point must be regarded as tentative.

Patterning

The patterning of these sites suggests that environmental conditions drew the Shoshone people to this location. The spatial distribution of sites is highly specific, indicative of a substantial link to the environment. Villages within the Wind River Range occur between 10,500 and 11,500 feet in elevation (Stirn 2014:525). This form of patterning can be tied to the growth and density of vegetation and the treeline. High altitudes bring colder temperatures and increased periods of frost, harmful to the growth of plants.

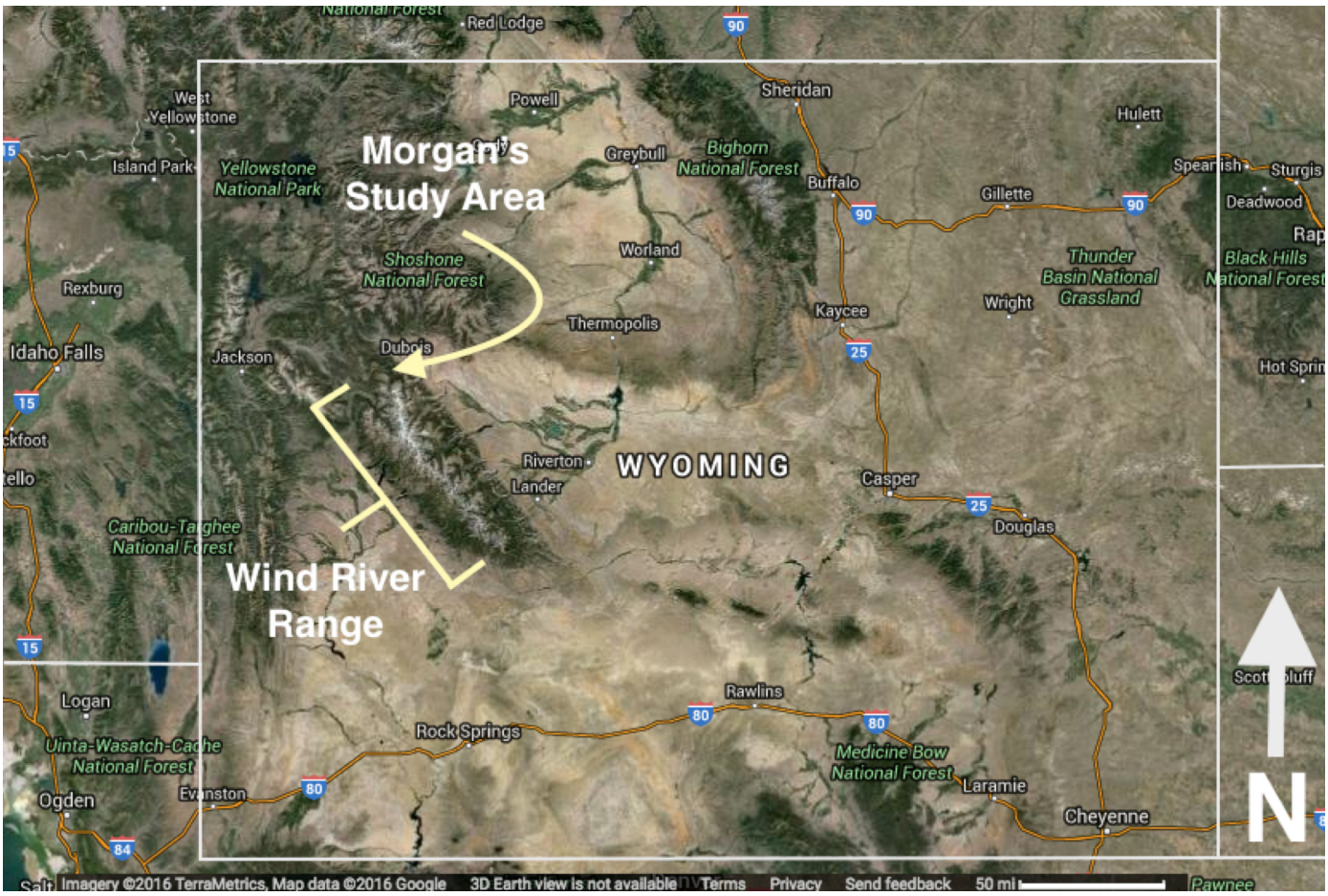

Figure 1 Map highlighting the Wind River Range, and Christopher Morgan's Study Area marking the approximate location of High Rise Village (Morgan et al. 2014:210).

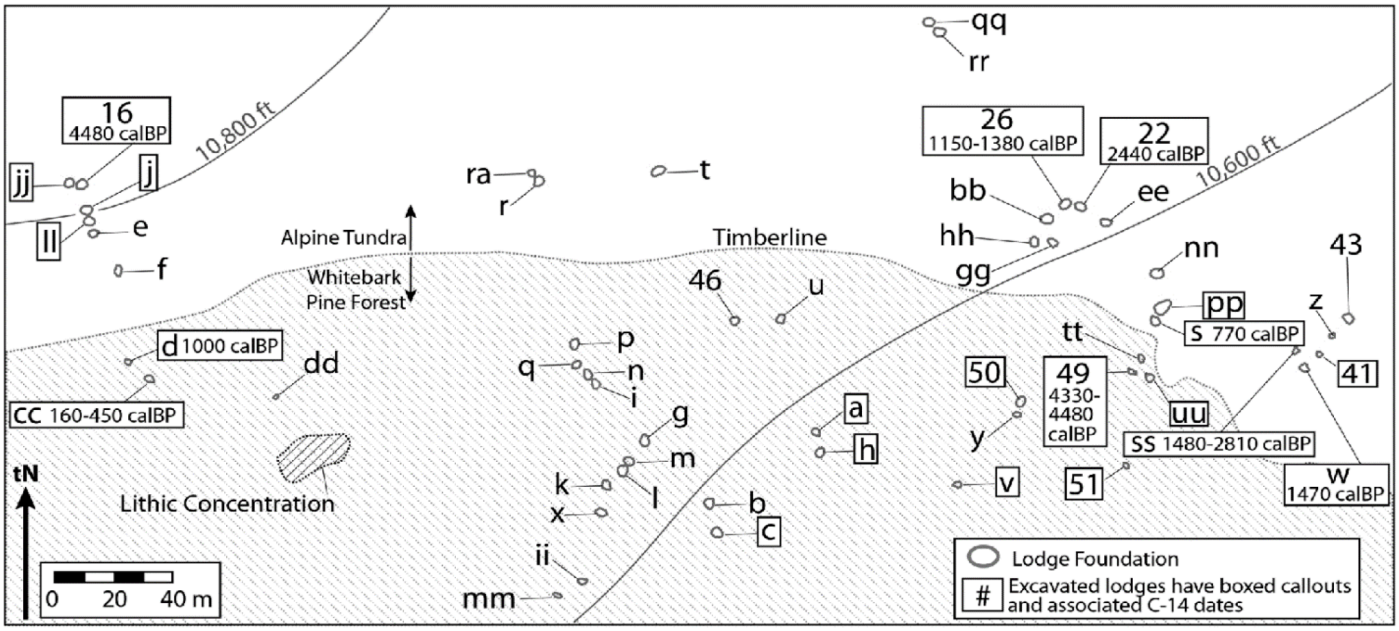

Figure 2 Map showing spatial distribution of lodge pads with associated radiometric dating (Morgan et al. 2012:41). Reprinted with permission.

In addition to the relatively narrow altitude band, villages in the Wind River Range are found on the south facing aspect of the mountains and on slopes primarily between 0-35% (Stirn 2014:525). Southern aspects of the mountains receive the most sunlight in the northern hemispheres and as a result would be warmer, more resistant to frost, and have a longer growing season for vegetation. The presence of villages explicitly on southern slopes suggests that the motivations for settlement in this extreme climate were heavily influenced by available vegetation. Of particular interest and mystery is the placement of these villages on slopes themselves, while Stirn (2014) notes that level areas are available that would have met the remaining settlement patterns in terms of resources. A map of lodge distribution in High Rise Village presents lodge location relative to the timberline and its proximity to lithic resources (Fig. 2).

Whitebark Pine

Whitebark pine is the most common tree within the Wind River treeline and is recorded at its highest densities in the Wind River Range between 10,300 and 11,300 feet (Stirn 2013:526). Dendrochronology at High Rise Village reveals that the climate conditions during the occupation of the village allowed whitebark pine to extend higher in elevation than in modern times by approximately 100-150m (Morgan et al. 2012:45) This prehistoric tree line would have encompassed the majority of High Rise Village, which can be seen in Christopher Morgan's map (Fig.3).

For the Numic cultures of the Great Basin and northwest Wyoming, whitebark pine nuts, both limber (*Pinus flexilis*) and piñon (*Pinus edulis*), are a traditional food source and make up the most available food source in the Wind River Range (Stirn 2014: 530). Edible roots, bulbs and fruits grown at high elevation ripen later than their low altitude counterparts (Adams 2006) allowing the same plants to be relied on for subsistence for a longer season with the appropriate mobility.

The availability of a traditional food source presents a solid motivation for residential mobility. According to Christopher Morgan (2009), residential movements are only more efficient than logistical movements when diet breadth is narrow or lower yield nutrients, such as the piñon nut are abundant, as they are near the site locations. The gathering of unprocessed piñon nuts further than 1.5 to 3.6 kilometers from a residence results in a caloric loss (Morgan 2009:383). The piñon nut, like other nuts that require processing to be edible, is simply inefficient for transportation in its weight to

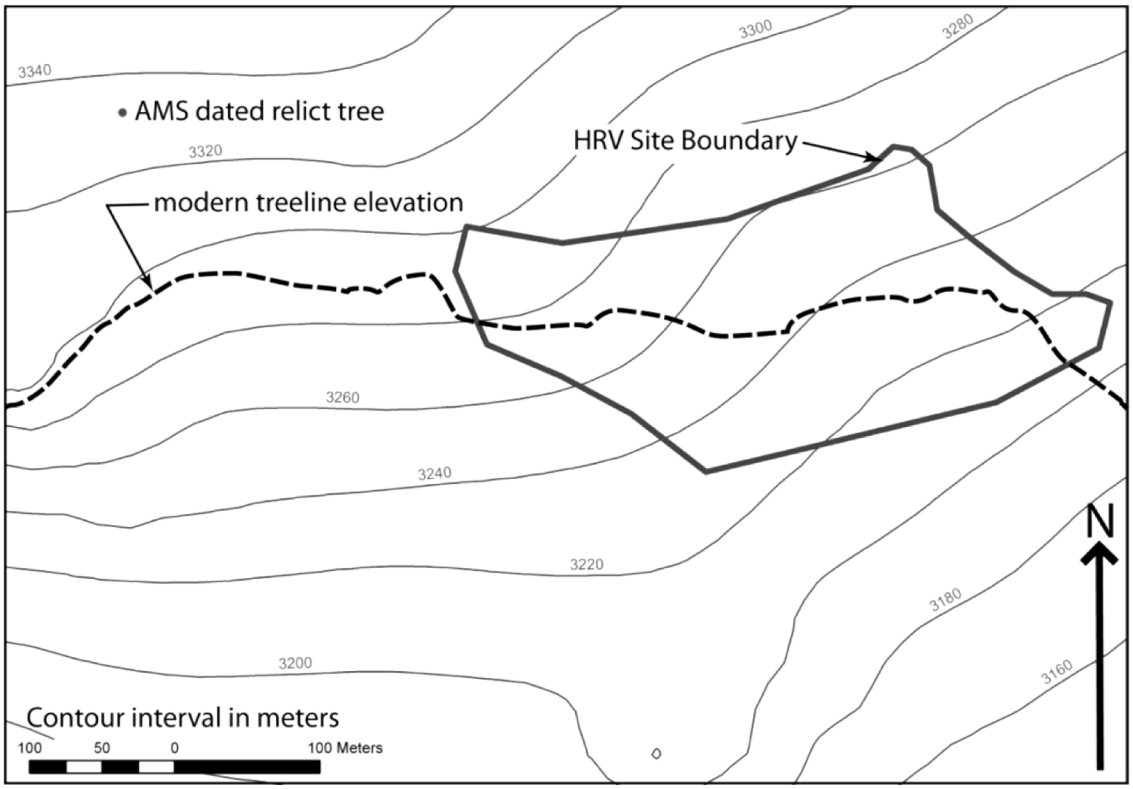

Figure 3 Map showing the modern treeline elevation in relation to High Rise Village (Morgan et al. 2012:45). Reprinted with permission.

calorie ratio. A sustainable settlement in the Wind River Mountains would require close proximity to dense clusters of white bark pine.

Moisture and Climate

Matthew Stirn's (2014) research into the hydrology and solar patterning of the Wind River Range revealed that settlements were located predictably within close proximity to moisture sinks and areas of high yearly sunlight to facilitate ideal growing conditions for whitebark pine trees, which demand both to grow optimally. Whitebark pine advance in Wind River Range, Union Peak occurred 1050 to 550 years prior to the Medieval Warming Period (Morgan et al. 2014:214).

Plant fossils and pollen suggest that the environment in western Wyoming warmed approximately four to sixteen centuries before the Medieval Warming Period and continued throughout its duration. In addition to this warming, moisture levels in the region increased starting in about 2,000 BP. Severe regional droughts between 820 and 780 years BP can be related to the retreat of the tree-line (Morgan et al. 2014:215).

These two moisture related changes, extreme in an environmental sense, suggest that the expansion of the whitebark pine was primarily influenced by moisture. This information supports the previous association of whitebark pine and moisture sinks, and ultimately with the location of settlements in the Wind River Range.

Hunting and Game

High Rise Village is located near a traditional bighorn sheep corridor (Stirn 2014: 529), providing excellent hunting opportunities for its inhabitants. Animals at this elevation are not exposed to the exhausting scale and frequency of hunting present at lower elevations and, as a result, have no natural fear of humans as predators. This includes bighorn sheep, moose, elk and antelope (Stirn 2014). Bighorn sheep provide an excellent resource of meat, furs, bone, and horns, and are present in large herds. Sheep traps near the eastern edge of the site (Morgan et al, 2012:529) provide evidence that bighorn sheep were a food source for the people of High Rise Village. Daniel Eakin (2012) describes deadfalls and catch pens, two forms of sheep traps used by the Shoshone. Deadfalls and catch pens were both constructed from wood, leaving them susceptible to the environment, and difficult to accurately date. Group hunting in north western Wyoming is evidenced archaeologically in the discovery of a large net dated to ca. 7700 cal BP. This massive net, fifty to sixty five meters long, would have required the cooperation of several hunters to operate (Lee 2012:172).

Further research conducted by Craig Lee (2012) shows that the alpine environment also presents unique opportunities for game in the form of ice patches. These patches, of which exploitation is common throughout the region, are present in the Greater Yellowstone Ecosystem (GYE) in alpine elevations, and create micro-environments for game as well as providing melt-water. Evidence suggests that ice patches in the GYE were targets of group hunting efforts that take advantage of the complacency of wildlife at a remote elevation. Primary game at these ice patches is bighorn sheep, though other species of ungulates are present (Lee 2012).

Lithic Toolkit

Madison Limestone and Flathead Sandstone provide an excellent source of high quality chert, quartzite, and steatite and are present throughout the history of the range (Stirn 2013:529). All 57 lodges excavated in 2010 and 2011 by Roger Adams' archaeology team contain some form of grindstone implement for food processing in the form of manos, metates and handstones (Morgan et al. 2012). Nut processing played a significant role in the material culture of the inhabitants, and supports the theory of whitebark pine nuts as a significant food source.

Figure 4 Rocky Mountain soapstone bowls. a., bowl preform b. unfinished; c. complete bowl; d. bowl fragments (Adams 2006:529). Image used with permission.

During the archaic period these local lithic resources were utilized almost exclusively, while debitage from sites occupied during the late prehistoric period show that more exotic lithic resources were preferred, and brought in from locations in excess of 70 miles. This information suggests that the patterning of Wind River sites was not a result of lithic resource proximity during the prehistoric period (Stirn 2014:529).

An exception to this seems to be steatite (soapstone) bowls, an indispensable item of the Mountain Shoshone toolkit. Steatite bowls are resistant to thermal shock, allowing them to be placed from temperatures below freezing into fire without cracking (Adams 2006:528), a feature that would have been tremendously valuable during Wyoming winters. Shoshone steatite bowls are undecorated, flowerpot shaped and possess flat or flanged bases (Fig. 4).

Unlike baskets, whose lesser weight makes them portable, stone bowls must be crafted near their source as a matter of transport efficiency (Adams 2006:539). Soapstone bowls are crafted with a removal method, slowly chipping away at the rock until the desired shape is formed, a process that can take months or even years (Adams 2006:530). These bowls would have been made near their source, high in the Wind River Mountains. This is supported by the distribution of unfinished bowls, which have an average altitude of 2,996 meters (Adams 2006:537), well within mobility range of the Wind River settlements. Adams provides a map (Fig. 5) illustrating the provenance of complete, unfinished and fragmentary steatite bowls in their highest concentrations among the range near Wind River Village.

Discussion

After examining the many environmental factors and local resources, it is clear that there were many incentives for the Wind River occupants to be drawn, rather than forced, into such high altitudes. The lithic evidence at Wind River Village supports both proximity to lithic resources as a motivation and, through its focus on nut and seed processing, the whitebark pine is a motivation as well. Easily accessible, and calorie efficient piñon nuts would have provided a convenient food source. A wealth of reasons to be drawn to the alpine and sub-alpine ecotone remain. There is clear evidence to support motivations for residential mobility in both lithic resource proximity, and piñon nut subsistence activities; the location of villages on slopes rather than level surfaces seems to be a mystery, at least for the

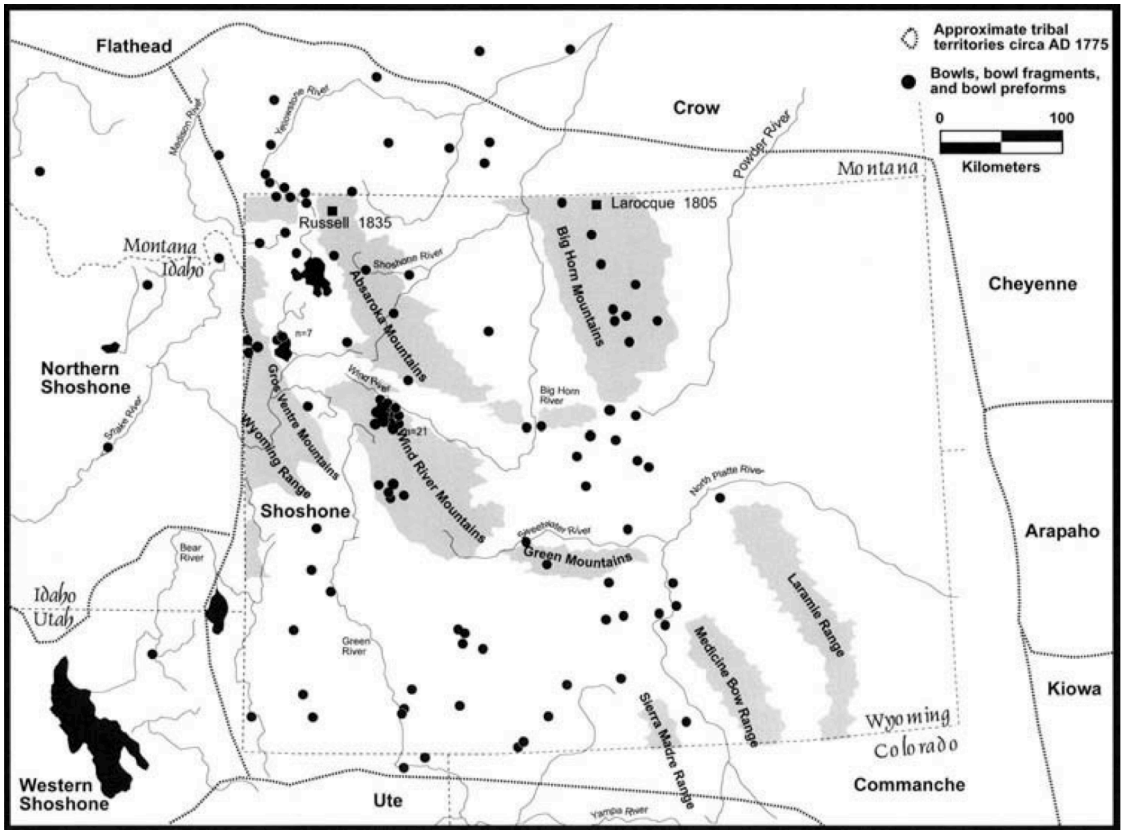

Figure 5 Map showing the distribution of soapstone bowls throughout Wyoming (Adams 2006:536). Image used with permission.

time being.

Positioning settlements on slopes may have been useful for the drainage of meltwater as the weather warmed with the approach of summer. Improved drainage would have allowed a longer stay in their seasonal mountain settlements, and more flexibility in their migration habits.

Conclusion

Examination of traditional resources of the Mountain Shoshone and their relation to the patterning of prehistoric alpine/subalpine ecotone settlements in the Wind River Range reveals a clear focus in the locations chosen. These locations provided a wealth of traditionally important resources that motivated the Mountain Shoshone out of surplus rather than scarcity. They were drawn, rather than forced into this plentiful ecotone that would have provided ample resources for seasonal occupation. It is critical to keep these motivations in mind, to avoid marginalizing the occupants of these mountain environments in a way that could profoundly impact our interpretation of future archaeological discoveries.

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Sources

Adams, Richard
2006 The Greater Yellowstone ecosystem, soapstone bowls and the Mountain Shoshone. World Archaeology 38(3): 528-546.

Eakin, Daniel H.
2005 Evidence for Shoshonean bighorn sheep trapping and early historic occupation in the Absaroka Mountains of Northwest Wyoming. University of Wyoming National Park Service Research Center Annual Report 29(1): 74-86.

Lee, Craig M.
2012 Withering snow and ice in the mid-lattitudes: A new archaeological and paleobiological record for the Rocky Mountain region. Arctic 65(1): 165-177.

Morgan, Christopher
2009 Climate change, uncertainty and prehistoric hunter-gatherer mobility. Journal of Anthropological Archaeology 28(4): 382-396.

Morgan, Christopher, Ashely Losey, and Lukas Trout
2014 Late-Holocene paleoclimate and treeline fluctuation in Wyoming's Wind River Range, USA. The Holocene 24 (2):209-219.

Morgan, Christopher, Ashely Losey, and Richard Adams
2012 High-Altitude Hunter-Gatherer Residential Occupations in Wyoming's Wind River Range. North American Archaeologist 33 (1):35-79.

Stirn, Matthew
2014 Modeling site location patterns amongst late-prehistoric villages in the Wind River Range, Wyoming. Journal of Archaeological Science 41(1):523-532.

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Charlton Heston's Rhetoric on Political Correctness, Use of Ideographs, and Construction of Ethos in "Winning the Cultural War"

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Faculty Sponsor: **Dr. Emily Plec**

This paper examines a speech, "Winning the Cultural War," that Charlton Heston gave to the Harvard University Law Forum in February 1999. Several years into the Democratic policies and gun control measures of the Clinton administration, Heston's Right-leaning speech critiqued the limitation of personal freedom and the national obsession with political correctness.
While on the surface Heston's speech reads (and probably sounded) inspirational and well-structured, it lacks the depth and clarity to spur long-lasting and specific change. Heston uses his image as an actor and as president of the NRA, as well as anecdotes and attempts at humor, to paint himself as a down-to-earth fatherly or professorial figure. He seems to hope and ask for a specific change, but his speech leaves a lot of room for (mis)interpretation.

Keywords: Charlton Heston, rhetoric, political correctness, cultural war, ideographs, ethos, persona, Winning the Cultural War, Harvard University Law Forum, NRA, gun rights, gun control, First Amendment, Second Amendment, freedom of thought, Right-wing, Clinton administration, speech, Chuck Heston

In February 16, 1999, several years into the Democratic policies and gun control measures of the Clinton administration, Charlton Heston, a well-known actor with a well-known face and well-known right-wing tendencies, gave a speech to the Harvard University Law Forum critiquing the limitation of personal freedom and describing a national obsession with political correctness. While on the surface Heston's speech, called "Winning the Cultural War," reads (and probably sounded) inspirational and well-structured, it lacks the depth and clarity to spur long-lasting and specific change. Heston uses his image as an actor and as president of the NRA, as well as anecdotes and attempts at humor, to paint himself as a down-to-earth fatherly or professorial figure. He seems to hope and ask for a specific change, but his speech leaves a lot of room for (mis)interpretation.

Charlton Heston was born on October 4, 1923 in Illinois as John Charles Carter. He later assumed his stepfather's surname, Heston, to create his screen name (*The Biography Channel Website*). Heston decided to become an actor after trying out for a high school play, and his involvement in the theater department earned him a scholarship to Northwestern University. He moved to New York City in 1946 and made his Broadway debut the following year in *Antony and Cleopatra* (*Encyclopædia Britannica*). He went on to play Moses in Cecil B. DeMille's *The Ten Commandments* (1956), arguably his best-known role, and starred in Orson Welles' *Touch of Evil* (1958) and William Wyler's *Ben-Hur* (1959). Heston's role in *Ben-Hur* won him an Academy Award and "secured his position as the premiere historical character actor in Hollywood" (*Encyclopædia Britannica*). Heston played Mark Antony in both *Julius Caesar* (1970) and in *Antony and Cleopatra* (1973), the latter of which he also directed. Other notable films, outside of the epic and historical genres, include the western *Will Penny* (1968) and the science fiction films *Planet of the Apes* (1968), *The Omega Man* (1971), and *Soylent Green* (1973).

In many of his films, Heston developed a "persona of an unflinching hero with a piercing blue-eyed stare and unbending, self-righteous Middle American ethics. Heston's heroes could be violent and cruel, but only when absolutely necessary" (Brennan). The characters he plays in films like *The Ten Commandments*, *Planet of the Apes*, and *Soylent Green* make unwavering distinctions between right and wrong: Moses, Taylor, and Thorn aren't afraid to disobey or challenge authority figures enforcing laws they believe to be morally wrong.

In the late 1950s, Heston had led two of the most famous scenes in cinema history: parting the Red Sea in *The Ten Commandments* and winning a chariot race in *Ben-Hur*. Emilie Raymond (2006) wrote that these films "constructed a public image for the actor that embodied responsibility, individualism, and conservative masculinity, values that Heston himself embraced" (p. 4). Heston was known to accept roles that embodied these

qualities and reject scripts that did not (Raymond, 2006, p. 4). As such, over time, Charlton Heston's public image could not be separated from his film roles—though whether it was because there was no difference or because people couldn't see it is uncertain. Heston himself may have been unable to distinguish some of his personal beliefs from those of the characters he played:

> "I think it would be pompous of me to say I played Moses and found God. However, playing the two religious characters I have done, John the Baptist and Moses, two pretty good characters, has definitely marked my life. So has Richelieu; so has playing McCloud in Detective Story […] Yes, it would be fair to say that the experience of exploring these guys has been a profound influence on my life." (Stoddard & SerVaas, 1984, p. 103, p. 110)

Additionally, Heston's "deep voice and noble physique" (*The Biography Channel website*), which had made him a popular choice for epic films, added to an image that probably boosted his ethos during his years as an activist. The persona that Heston constructed in his films was useful in his political career, and this link between fiction and reality exemplified the rise of image politics in America. As defined by Steven J. Ross (2011), image politics is the phenomenon of a celebrity's screen image being "so widely venerated that large numbers of Americans pay close attention to his or her political pronouncements" (p. 272). In this case, Heston had become so popular that more Americans were becoming interested in his political opinions and activities. Unlike other actors who have shifted out of their film roles to speak for important causes, Heston's persona was one and the same:

> When Charlie Chaplin shifted from visual politics to issue-oriented politics he did not assume the role of the Tramp; he spoke as himself. But for Heston, the image and the man merged into one: he was always Moses, always the savior, lawgiver, and patriarch. (Ross, 2011, p. 272)

Outside of the Broadway and Hollywood spheres, Heston continued to adopt this persona and attitude toward injustice in his work as an activist for civil and gun rights. Heston participated in the March on Washington with Martin Luther King, Jr. and in speeches often referred to King's policy of civil disobedience. He later became the president of the U.S. National Rifle Association (1998–2003) and a spokesperson for gun rights. Heston was known in later years as a conservative Republican and worked with President Ronald Reagan on the Presidential Task Force on the Arts and Humanities (Brennan).

Heston's political career changed somewhat over the years, however, before settling into a decidedly right-wing position. Raymond (2006) separates his career into four stages. From 1955 to 1961, Heston began to lend his voice and celebrity status to national issues, publicly identifying with anticommunism and personal freedom. During this period, his activism was principally limited to national political campaigns (p. 5). Between 1961 and 1972, Heston lent his support to presidential candidates Lyndon B. Johnson in 1964, Hubert Humphrey in 1968, and Richard Nixon in 1972. He was associated during this time with Democratic Party, though he was not overzealous, and teamed with other celebrities to support LBJ's gun control measures and the Vietnam War. He also began a longstanding affiliation with the Screen Actors Guild (p. 5).

The third stage of Charlton Heston's political career, beginning in 1972, marked a period of partisan activity:

> Even though his political beliefs remained largely unchanged, he worked almost solely with the Republican Party, and he began to see Democrats as a threat to American stability and superiority. […] Heston's close friendship with President Ronald Reagan deepened his partisanship, while his increasing involvement with special interest groups emboldened his newly dogmatic approach. (Raymond, 2006, p. 6)

It was Reagan who first got Heston interested in "motion picture politics," and who, after taking office, appointed him to the Presidential Task Force on the Arts and Humanities as Chairman for the Arts (Munn, 1986, p. 195). Heston continued to lend his support to Reagan throughout his presidency, and after the Democratic Party adopted affirmative action, Heston began to lean toward the right. He said in an interview with Donald Chase (1983) that, though he had initially supported causes associated with the Democratic Party, he had never belonged to either party (p. 44). Heston later clarified, when he registered as a Republican in 1987, "'the Democratic Party moved, I didn't'" (Fitzpatrick, 2009, p. 215).

In Charlton Heston's final stage of activism, beginning in 1995, he joined the board of the National Rifle Association, and delivered speeches that examined and often attacked the changes to American culture and society that had occurred since the 1960s (Raymond, 2006, p. 6). He also wrote several books on the subject. According to Raymond (2006), he targeted the media

and university systems in his speeches about the American culture war; “in true neoconservative fashion, he blamed the media and academe for imposing political correctness and multiculturalism on the citizenry and encouraged Americans to return to traditional moral values” (p. 7). Heston believed that Americans had gotten out of touch with its core values, as evidenced by the shifting tenets of political parties, and that they had to take a stand to maintain core American ideals.

Heston was known to speak on many controversial issues, including homosexuality, feminism, and gun rights, as well as racism and white supremacy (Hornblower). He was unafraid to voice stark opinions, and his refusal to shy away from moderate or politically correct views has made him somewhat of an infamous political figure. Heston’s publicist, Michael Levine, worried that his outspokenness would and already had damaged his career, saying that it’s “far better in Hollywood to admit you’re a drug addict than a conservative” (Hornblower).

When Heston was elected president of the NRA in 1998, the organization’s “aura of invincibility [had] evaporated with the 1993 passage of the Brady Bill, requiring a five-day waiting period to purchase handguns, and, later, a Clinton-backed ban on manufacturing and importing assault weapons” (Hornblower). As president, it was Heston’s goal to sell the previously demonized organization to the public and boost its image. In a speech delivered at the 129th NRA convention in May 2000, Charlton Heston criticized Al Gore and Democratic gun-control campaigns, and rallied together over 2000 listening NRA members with his provocative rhetoric:

> For the next six months, Al Gore is going to smear you as the enemy. He will slander you as gun-toting, knuckle-dragging, bloodthirsty maniacs who stand in the way of a safer America. Will you remain silent? I will not remain silent. If we are going to stop this, then it is vital to every law-abiding gun owner in America to register to vote and show up at the polls on Election Day. (Dao)

In 2002 Heston revealed that he had symptoms consistent with Alzheimer’s disease, and in 2003 began to withdraw from public life, though he still videotaped his final comments on the gun control issue for the NRA convention in April 2003. Heston passed away in his home on April 6, 2008 (Ross, 2011, p. 312).

The exigence that Charlton Heston addresses in his speech to the Harvard University Law Forum, “Winning the Cultural War,” is a lack and limitation of personal freedom. Heston believes that the values of freedom and liberty upon which this country is founded are inherently deserved by every human being; however, these rights have been stifled by government and individual cowardice. He best expresses this in his introduction:

> I want to […] reconnect you with your own sense of liberty, your own freedom of thought, your own compass for what is right.
>
> Dedicating the memorial at Gettysburg, Abraham Lincoln said of America, “We are now engaged in a great Civil War, testing whether this nation or any nation so conceived and so dedicated can long endure.”
>
> Those words are true again. I believe that we are again engaged in a great civil war, a cultural war that’s about to hijack your birthright to think and say what lives in your heart. I’m sure you no longer trust the pulsing lifeblood of liberty inside you, the stuff that made this country rise from wilderness into the miracle that it is. (1999, p. 357)

Heston goes on to say that this “persecution” does not stop at Second Amendment rights, but that, “with Orwellian fervor, certain acceptable thoughts and speech are mandated” (1999, p. 357) across the country. He disparages the concept of political correctness and points to the backlash he received when saying that “white pride is just as valid as black pride or red pride or anyone else’s pride” and that “gay rights should extend no further than your rights or my rights” (1999, p. 357). Heston believes that not only are different groups not receiving equal rights, but that people aren’t allowed to address these differences openly without being attacked. He takes the position that the acknowledgment of discrimination is not necessarily an endorsement of discrimination, saying he points out differences in treatment in the hopes of offsetting them.

In his speech, Heston addresses gun control policies of the time and, as president of the NRA, he represented a significant and influential voice against gun control. In 1999 the U.S. was under the Clinton administration; Clinton had begun his Democratic presidential campaign in 1992 by emphasizing that crime was on the rise in the U.S., particularly in inner-city areas, and "the party promised to restore government as the upholder of basic law and order for these and all crime-ravaged communities" (Marion, 1997, p. 69). Though Clinton's agenda for crime control was initially much more conservative than one might expect from a liberal candidate—promising to put more officers on the street and displaying a resistance to restrict gun use for

legitimate sporting or hunting purposes—he eventually placed more emphasis on gun control during his presidency (Marion, 1997). In 1993 Clinton signed the Brady Bill, later known as the Brady Handgun Violence Protection Act, which instituted a five-day waiting period for the purchase of a handgun and established a nationwide computerized background check system (Mario, 1997, pp. 78-79). According to Marion (1997), in 1994 "Clinton called for legislation banning assault weapons and handgun ownership by minors while at the same time allowing hunters and law-abiding citizens to own guns" (p. 82). These two pieces of legislation represented important strides in the area of gun control, and were only a few years old when Charlton Heston gave his speech to Harvard University Law Forum. To Heston, who valued First and Second Amendment freedoms perhaps above all others, this legislation represented a massive attack on liberty.

Charlton Heston addressed his speech to Harvard Law School Forum, a student organization described on the website of Harvard Law School (a professional graduate school of Harvard University) as "a non-partisan organization dedicated to bringing open discussion to a campus on a wide range of legal, social, and political issues." The organization has hosted many historically important figures, such as Presidents John F. Kennedy and Jimmy Carter, Justice Thurgood Marshall, Fidel Castro, and Henry Kissinger. According to the Harvard Law School Forum website, its mission is "to facilitate timely discussion on important topics, allowing students to interact with the people that help shape the world they live in." This group presumably invited Heston to speak and had an interest in what he had to say, and he chose this speech to aim at this particular group (graduate law students from Harvard):

> Why did political correctness originate on America's campuses? And why do you continue to tolerate it?
>
> Why do you, who're supposed to debate ideas, surrender to their suppression? […]
>
> You are the best and the brightest. You, here in the fertile cradle of American academia, here in the castle of learning on the Charles River, you are the cream. But I submit that you, and your counterparts across the land, are the most socially conformed and politically silenced generation since Concord Bridge. And as long as you validate that … and abide it … you are—by your grandfathers' standards—cowards. […]
>
> Who will guard the raw material of unfettered ideas, if not you? Democracy is dialogue! (1999, p. 358)

Heston addresses his speech directly to the audience before him, rather than appealing generally to Americans or to the public. He tells Harvard Law School Forum directly: in order to "prevail against such pervasive social subjugation" (1999, p. 358), simply disobey: "I am asking you to disavow cultural correctness with massive disobedience of rogue authority, social directives and onerous laws that weaken personal freedom" (1999, p. 358). In Heston's mind, America's youth are being censored, forced to fit their opinions into the oppressive mold of political correctness. This exigence is what Heston asks his audience to address, by standing up to "the Man" and saying what they believe to be right, even if it costs them their pride, their jobs, or even their lives—"Dr. King stood on lots of balconies," Heston points out (1999, p.358). The students of Harvard Law School Forum have the power to address the exigence if they would only stop being afraid, Heston argues.

Charlton Heston's biggest advantage in reaching his audience is his stardom. Heston was a well-known actor who played grand and heroic roles, such as Moses, Ben-Hur, George Taylor in *Planet of the Apes*, and Col. Robert Neville in *The Omega Man*. It may be difficult to separate a celebrity like this from his roles, and he thus may have had a stronger influence over his audience than if he were known for different kinds of roles. Conversely, it is also possible that his role as an actor, particularly one from an age gone by (in the eyes of university students), may have made him somewhat of an antiquated or outdated figure. His anecdotes and list of the roles that he had played may have held little relevancy for a younger audience, or he may have been perceived as a mere actor with no business in politics.

Other aspects of his reputation may have posed somewhat of a disadvantage for Heston in giving this speech, particularly as president of the N.R.A. and an advocate for gun rights. Though Heston represented an educated and authoritative voice on gun rights and personal freedoms, he also represented a minority opinion under the Democratic Clinton administration, and his views on Second Amendment rights may have been looked down upon. He actually addresses further constraints in his speech, pointing out that he has been called racist, sexist, homophobic, and anti-Semitic for previous public statements he has made. Heston attempts, however, to disprove these accusations and validate his speech—"If you talk about race, it does not make you a racist. If you see distinctions between the genders, it does not make you sexist," etc. (1999, p.

358).

Heston's speech to the Harvard University Law Forum, "Winning the Cultural War," begs the question: What is Heston's purpose in speaking to this audience and with this speech? He states at the beginning, "I want to […] reconnect you with your own sense of liberty … your own freedom of thought … your own compass for what is right," (1999, p. 357) and he emphasizes throughout the speech his desire to help his audience get in touch with their roots. However, the specificity of the speech's message doesn't extend far beyond this. Heston repeatedly encourages his audience to "disobey" authorities that seek to curb their personal freedoms and to withstand the "superstition of political correctness [that] rules the halls of reason" (1999, p. 358).

What is political correctness, though? Which kind is bad and which is good? Heston, after pointing out that his audience's generation is "the most socially conformed and politically silenced generation since Concord Bridge" (1999, p. 358) and calling them cowards for allowing that, he attacks Ice-T for releasing a CD "celebrating ambushing and murdering police officers" (1999, p. 358). He describes a Time/Warner stockholders' meeting that he attended to read aloud the full lyrics of "Cop Killer," one of the songs from the CD, and stun the stockholders. Though Heston claims to believe that everyone has a "birthright to think and say what lives in your heart," (1999, p. 357) Ice-T apparently did not have this right; Heston's attendance at the meeting resulted in Time/Warner's termination of the artist's contract. Ice-T's music, which outraged people around the country, could have, by Heston's standards, been characterized as disobedience and resistance of political correctness. Heston warns of a cultural war "in which, with Orwellian fervor, certain acceptable thoughts and speech are mandated," but it seems that Heston himself admits to mandating acceptable speech.

In his speech, Heston describes several cases exemplifying the failures of the education system, though in a couple cases it is unclear at whom his incredulity is aimed:

> At William and Mary, students tried to change the name of the school team "The Tribe" because it was supposedly insulting to local Indians, only to learn that authentic Virginia chiefs truly like the name.
>
> In San Francisco, city fathers passed an ordinance protecting the rights of transvestites to cross-dress on the job, and for transsexuals to have separate toilet facilities while undergoing sex change surgery. (1999, pp. 357-358)

Heston follows up these stories with an interpretation: "It means that telling us what to think has evolved into telling us what to say, so telling us what to do can't be far behind" (1999, p. 358). If Heston's point is, then, that people shouldn't be told what to say or do, does he agree with the William and Mary students or the Virginia chiefs? Does he side with the city fathers and the rights of transvestites and transsexuals, or is he criticizing their decision to make exceptions? Furthermore, his condemnation of Ice-T doesn't seem to correspond with his warning of Orwellian dictation of speech and thought; perhaps he believed that he was protecting a wider public from being told what to do by telling Ice-T and Time/Warner what to do.

According to Barbara O'Keefe (1992), critics of political correctness are often highly selective in the cases they choose to highlight as examples of PC's atrocities. She quotes Calvin Mackenzie, who wrote:

> The critics who coined the term political correctness see it as a set of invidious trends in which fad brushes aside tradition. The problem is that save in exceptional and transitory cases, the picture that critics paint bears little resemblance to life on contemporary college campuses. (p. 123)

It may be, then, that Charlton Heston views political correctness as a subversion of *tradition*, and values tradition more than freedom of speech. Ice-T's lyrics presumably defied a tradition of respect—as well as a tradition of avoiding obscenities, profanities, or vulgarities—that Heston believed was his duty to restore. He was not the only one upset by the lyrics; police around the country were upset by "Cop Killer," "but Time/Warner was stonewalling because the CD was a cash cow for them, and the media were tiptoeing around it because the rapper was black" (Heston, 1999, p. 358). This attitude goes along with Heston's policy on affirmative action and discrimination; he believed that minorities shouldn't be given preferential treatment in order to avoid accusations of racism, as that would be a form of reverse discrimination. Heston acknowledges in his speech that he has been criticized for such opinions, and that his discussions of racism, sexism, and other prejudices have earned him accusations of being the very thing he despises:

> I marched for civil rights with Dr. King in 1963—long before Hollywood found it fashionable. But when I told an audience last year that white pride is just as valid as black pride or red pride or anyone else's pride, they called me a racist. […]

> Everyone I know, knows I would never raise a closed fist against my country. (1999, p. 357)

Charlton Heston was known to touch on sensitive subjects, and often a mere acknowledgement of difference can agitate audiences. As such, Heston blamed a new trend of political correctness for the backlash he received. O'Keefe (1992), however, trivializes the issue of political correctness, writing that it is not as pervasive and inclusive of an issue as it often made out to be:

> To the extent that PC enters our academic lives, it does so either because someone with right-wing politics needs a windmill at which to tilt, or because some petty bureaucrat decides that it is important to know what the university is doing to be politically correct. (p. 125)

O'Keefe adds that political correctness is often blamed for a wide range of independent issues in the university system, including selection of curriculum, disciplinary policies and procedures, and how the university deals with discrimination and intolerance among students. According to O'Keefe (1992), "the very general terms in which the PC debate is conducted do not connect well to the detailed and practical issues involved in articulating a coherent vision of general education and its implementation in a curriculum" (p. 126). Heston says little about the specific workings of the university system, but covers it with a blanket of political correctness.

Charlton Heston does a good job of employing ideographs and god terms in "Winning the Cultural War," though the extent to which he uses them is potentially excessive, obscuring his message. Heston frequently mentions "liberty" and quotes Abraham Lincoln at Gettysburg, in perhaps the most emotionally charged segment of "Winning the Cultural War":

> "We are now engaged in a great Civil War, testing whether this nation or any nation so conceived and so dedicated can long endure." Those words are true again.
>
> I believe that are we again engaged in a great civil war, a cultural war that's about to hijack your birthright to think and say what lives in your heart.
>
> I fear you no longer trust the pulsing lifeblood of liberty inside you … the stuff that made this country rise from wilderness into the miracle that it is. (1999, p. 357)

Heston continues to name-drop throughout the speech, beginning with his list of the historically influential characters he has played and which have influenced him in turn, and ending with the statement, "If Dr. King were here, I think he would agree" (1999, p. 359). He cites Dr. King in urging his listeners to disobey, saying that every "great man who led those in the right against those with the might" (including Gandhi, Thoreau, and Jesus) practiced disobedience. Heston mentions these names to make his audience believe that they can aspire to be as influential as these leaders, and uses name-dropping to construct ethos as a rhetor. He relies heavily on his role as an actor and as president of the NRA to present an authoritative persona to his audience. He speaks as a fatherly or professorial figure giving advice to his children or students: "Don't let America's universities continue to serve as incubators for this rampant epidemic of new McCarthyism," (1999, p. 358) and the characters whose morals he has made his own certainly support this image. At the end of his speech, he places the responsibility on the shoulders of his listeners, as if he trusts them to carry on his essential, if somewhat ambiguous, mission:

> So that this nation may long endure, I urge you to follow in the hallowed footsteps of the great disobediences of history that freed exiles, founded religions, defeated tyrants, and yes, in the hands of aroused rabble in arms and a few great men, by God's grace, built this country. (1999, p. 359)

These seemingly casual mentions of key figures and events in America's history are meant to incite a primal patriotism in his audience—and perhaps distract from the fact that his message doesn't go much deeper than these ideographs. An attempt to read further into his speech reveals an uncharacteristic lack of depth; compared to previous speeches Heston had made, "Winning the Cultural War" relies too heavily on ambiguous ideals.

Despite this rhetorical deterioration in later years, Charlton Heston was an important figure in the rhetoric surrounding gun control policy, and effectively constructed a credible persona from characters with high moral standing. His audiences believed he really was a man, like his film characters, who would do everything he could to fix a world gone wrong (whether it be parting the Red Sea, blowing up a post-apocalyptic Earth overtaken by apes, or exposing the truth about a dystopian food supply). Heston may have even convinced himself—"there always seems to be a lot of different fellows up here and I'm never entirely certain which one of them gets to talk" (Heston, 1999, p. 357). Having played so many historical and Biblical figures in

movies, it seems natural for him to hold himself up alongside Martin Luther King, Jr., Gandhi, and Jesus. In this way, Heston positions himself as a credible and respectable rhetor for the audience of the Harvard Law School Forum, but he fails to deliver a relevant and clear-cut directive. In the end, his audience is left only with the instruction to disobey, but whether that disobedience should be directed at the press, offensive rappers, or state legislature—or for that matter, maybe even at Heston himself—is left unsaid.

Asante, M. K. (1992). The escape into hyperbole: communication and political correctness. *Journal of Communication*, *42*(2), 141–147.

Burgoon, M., & Bailey, W. (1992); PC at last! PC at last! Thank God almighty, we are PC at last!. *Journal of Communication*, *42*(2), 95–104.

Brennan, S. (2014). Charlton Heston. *AllMovie*, www.allmovie.com.

Carey, J. W. (1992). Political correctness and cultural studies. *Journal of Communication*, *42*(2), 56–72.

"Charlton Heston". (2014, a). *The Biography Channel website*, www.biography.com.

"Charlton Heston". (2014, b). *Encyclopædia Britannica*, www.britannica.com.

Chase, D. (1983). Between scenes with Charlton Heston. *Saturday Evening Post 225*(8), 42-45. Retrieved from Academic Search Premier, EBSCO*host*.

Dao, J. (2000, May 21). N.R.A. leaders cast Gore as archenemy. *The New York Times*, www.nytimes.com.

Demerath, N. J. (2005). The battle over a U.S. culture war: a note on inflated rhetoric versus inflamed politics. *The Forum*, *3*(2), 1–11.

Dennis, E. E. (1992). Freedom of expression, the university, and the media. *Journal of Communication*, *42*(2), 73–83.

Dombrink, J. (2012). After the culture war?: shifts and continuities in American conservatism. Canadian Review of American Studies, 42(3), 301–321.

Fitzpatrick, J. (2009). Heston, Charlton. In Jackson, K.T., Markoe K., & Markoe, A. (Eds.), The Scribner encyclopedia of American lives (Vol. 8) (pp. 213–216). New York, NY: Charles Scribner's Sons.

Harvard Law School Forum. "1L Welcome." The Harvard Law School Forum, HLSOrgs. Retrieved from http://www3.law.harvard.edu/orgs/hlsforum/.

Heston, C., & Alpert, H. (1978). The actor's life: Journals, 1956–1976. New York, NY: E.P. Dutton.

Heston, C. (1995). In the arena: An autobiography. New York: Simon & Schuster.

Heston, C. (1999). Winning the cultural war. Vital Speeches of the Day 65(12), 357–359. Retrieved from Academic Search Premier, EBSCOhost.

Hollywood roundtable: Civil rights, 1963. (2008). Films on Demand. Retrieved from http://ezproxy.wou.edu:2120/PortalPlaylists.aspx?aid=14402&xtid=48826.

Hornblower, M. (1998). Have gun, will travel: But can Heston's celebrity and rhetoric revive the N.R.A.? Time 151(26), 44. Retrieved from Academic Search Premier, EBSCOhost.

Jbranstetter04. (2008, April 26). Charlton Heston; From My Cold Dead Hands. Long Version [Video file]. Retrieved from http://www.youtube.com/watch?v=5ju4Gla2odw.

Kotlowski, D. J. (2007). From my cold, dead hands: Charlton Heston and American politics [Review]. Pacific Historical Review 76(4), 660–662. Retrieved from America: History & Life, EBSCOhost.

Losey, K. M., & Kurthen, J. (1995). The rhetoric of 'political correctness' in the U.S. media. Amerikastudien/American Studies, 40(2), 227–245.

Marion, N. E. (1997). Symbolic policies in Clinton's crime control agenda. Buffalo Criminal Law Review 1(1), 67–108. Retrieved from University of California Press, JSTOR.

Moore, M. (Director). (2003). Bowling for Columbine [Motion picture]. United States: MGM Home Entertainment.

Munn, M. (1986). Charlton Heston. New York, NY: St. Martin's Press.

O'Keefe, B. J. (1992). Sense and sensitivity. Journal of Communication, 42(2), 123–130.

Palczewski, C. H., Ice, R., & Fritch, J. (2012). Rhetoric in civic life. State College, PA: Strata Publishing.

Raymond, E. (2005). The agony and the ecstasy: Charlton Heston and the Screen Actors Guild. Journal of Policy History 17(2), 217–223. Retrieved from Academic Search Premier, EBSCOhost.

Raymond, E. (2006). From my cold, dead hands: Charlton Heston and American politics. Lexington, KY: University Press of Kentucky.

Ross, S. J. (2011). Moses and the red tide: Charlton Heston. In Hollywood left and right: How movie stars shaped American politics (pp. 271–313). New York, NY: Oxford University Press.

Shelton, M. W. (1996). The role of the right—a focus on the 'political' in 'political correctness'. Journal of the Association for Communication Administration, (3), 215–218.

Smant, K. J. (2007). From my cold, dead hands: Charlton Heston and American politics [Review]. Journal of American History 94(1), 349–350. Retrieved from America: History & Life, EBSCOhost.

Stoddard, M., & SerVaas, C. (1984). Charlton Heston: He'd rather pretend than be president. Saturday Evening Post 256(6), 42–110. Retrieved from Academic Search Premier, EBSCOhost.

VPC.org - Violence Prevention Campaign. (2002). From the gun war to the culture war: How the NRA has become the pillar of the right. Violence Policy Center, Retrieved from http://www.vpc.org/studyndx.htm.